WASHINGTON REALTORS®

January 17, 2020

Annie Sawabini
Department of Ecology, Water Resources Program
PO Box 47600
Olympia, WA 98504-7600

**RE: Comments on Nooksack Instream Flow Rule, Chapter 173-501 WAC**

Dear Ms. Sawabini:

Washington REALTORS® represents the interests of over 20,000 REALTORS® and their clients in Washington State. We appreciate the opportunity to submit comments on the Washington Department of Ecology's ("Ecology") proposed amendments to Chapter 173-501 WAC, the Nooksack Instream Flow Rule.

Over the past 20 years, the issue of rural water availability has significantly impacted the real estate market and homeowners in many parts of Washington State. Our state's near obsession with exempt wells has resulted in a regulatory system that is costly and complicated. The financial and human resources and legal complexity associated with exempt wells has been disproportionate to their water resource impact. Or as said in the song *Juice* by Lizzo, "the juice ain't worth the squeeze."

Much of this complexity has been caused by Ecology's instream flow rules. Implementation of ESSB 6091 is an opportunity to reduce regulatory complexity that provides no commensurate water resource benefit. In reversing the Hirst decision, the Legislature provided a record amount of capital funding. Projects, not regulations, are the best path to protect and restore instream flows. REALTORS® ask that Ecology strive to create a simply regulatory structure with the end users in mind – people who own or buy vacant land in rural areas, REALTORS® who assist them in this process, homebuilders, homeowners, and counties.

We have prepared more detailed comments included with this letter, as well as technical and other documents to be included in the rulemaking record. If you have further questions, please contact Bill Clarke at (360) 561-7540.

Sincerely,

*Kitty Wallace*
Kitty Wallace, 2020 President
Washington REALTORS®

Enc.

**Comments on Proposed Amendments to Chapter 173-501 WAC**
**Nooksack Instream Flow Rule**
**Bill Clarke, for Washington REALTORS®**

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## 1. The Rule Creates an Overly Complicated System That Increases the Amount of Time, Money, and Human Resources Devoted to Analyzing and Regulating Small Water Uses (That Will be Offset Anyway)

Over the past 20 years, the increasingly complexity of Ecology's instream flow rules on exempt wells has created significant problems for landowners, local governments, and agency itself – all without a commensurate water resource benefits. The implementation of ESSB 6091 is an opportunity to end this trend, and redirect water resource efforts toward more significant issues. Under ESSB 6091, the consumptive use from new domestic exempt wells will be entirely offset by projects within the Nooksack Basin – so why both offset consumptive use projections AND create a complicated regulatory system?

Ecology's proposed rule would establish a number of different limits, under different situations, that unnecessarily limit homeowners and that neither Ecology or local governments are or should be staffed or funded to implement in a meaningful way. For example, the rule proposes a daily gallon per day limit of 500 gallons per day – as opposed to a much simpler to implement metric of a maximum average annual withdrawal, used by the Legislature in ESSB 6091. RCW 90.94.020(5)(f)(ii). The proposed rule limits outdoor irrigation to 1/12$^{th}$ of an acre per single domestic connection.

These limits are far lower than those adopted by the Legislature in ESSB 6091, and far less than what a reasonable homeowner may need to use. Further, Ecology's rule analysis compares the proposed Nooksack limits to those in other recent Ecology instream flow rules (Stillaguamish, Entiat, Quilcene, etc.). The significant difference is that in the Nooksack Basin under ESSB 6091, all new domestic exempt use will be offset through instream flow projects. In the other WRIA rules used for comparison by Ecology, there is no such equivalent provision. And ironically, Ecology's rule analysis does mention, let alone analyze, its most recent adopted instream flow rule, Chapter 173-557 WAC, for the Spokane River. In that rule, Ecology adopted a far simpler rule structure without domestic exempt well limits and instead acquired water rights to offset future projected exempt well consumptive uses.

The drought limits also create complexity, especially given the increasing occurrence of declared droughts in Washington State. Outdoor irrigation can be curtailed during a declared drought, but only to the extent that the outdoor irrigation is not "subsistence gardening." That likely means that lawns, flowers, and non-fruit bearing bushes and trees could not be irrigated, but food-bearing crops could still be irrigated in a drought. Taken together, this means that by adopting such a proposed rule, Ecology is creating the expectation that it will meaningfully enforce the variety of limits during non-drought and drought conditions on new domestic exempt wells.

If Ecology's objective is to reduce consumptive outdoor water by exempt wells, its priority should be on those exempt well users whose outdoor use exceeds the ½ acre non-commercial lawn and garden limit in RCW 90.44.050. The irrigation acreage analysis provided to Ecology by RH2 Engineering shows that 34% of homes built between 2000 and 2014 have no outdoor irrigation at all; and that if irrigation over ½ acre was eliminated, the mean area irrigated by homes built during this time period would be only .18 acres, about 1/3 of what could be lawfully irrigated under the ½ acre non commercial lawn and garden limit in RCW 90.44.050.

**2. The Rule Analysis Greatly Overestimates the Impact to Instream Flows Associated With New Domestic Exempt Wells.**

Ecology's rule analysis greatly overestimates the impact of new exempt wells on instream flows by improperly focusing solely on the quantity of water withdrawn from new exempt wells, rather than calculating the actual impact on instream flows.

One of the purposes of ESSB 6091 was to offset impacts to instream flows that may occur over the next 20 years. The statute is replete with some version of the phrase "impacts to instream flows" – see RCW 90.94.020(1) (. . . "potential impacts on a closed water body and potential impairment to an instream flow are authorized . . . "); .020(4)b) (". . . those actions . . . necessary to offset potential impacts to instream flows . . . ") The statute is not focused narrowly on the quantity of water withdrawn from wells, but rather, more broadly on impacts to instream flows *associated with* permit-exempt domestic water use."

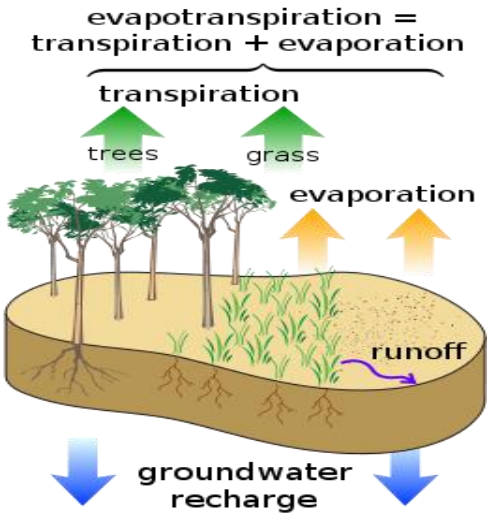
In contrast, Ecology's proposed rule, and related documents focus narrowly on the withdrawal from the well, not the impacts on instream flows. For example, the Ecology document "Recommendations for Water Use Estimates" document states: "ESSB 6091 requires offsetting the quantity of water consumptively used by future domestic permit-exempt wells . . . " (Page 4). The statute is not tied narrowly to water "used by" the well as Ecology's document states – the statutory phrase is "impacts to instream flows "associated with" permit-exempt domestic water use.

So, what is the actual, factual, "impact" over 20 years that is "associated with" domestic water use on instream flows? As to this question, Ecology's proposed rule and related guidance documents presume only those actions that will increase the "impact" on instream flows – but reject or ignore those actions that will reduce the instream flow impacts.

In the construction of a new house, there will typically be the removal of existing vegetation, and the consequential reduction in water use. This will occur in those areas needed for the driveway, septic drainfield, building footprint, and other structures. Ecology's acknowledged this reality in the Water Use Spreadsheet from one of its "Net Ecological Benefit (NEB) Workshop, as the water use projections stated: "** Does not take

into account direct and indirect impacts of property development – tree removal, impervious surfaces, stormwater control regulations."

In the pre-development condition, vacant land will have a certain amount of consumptive water use, depending on the type of vegetation on site. Some of this vegetation (and thus the consumptive use associated with the vegetation) will be permanently removed as part of the home construction process. For example, if the diagram below represents a building parcel in the pre-development condition, home construction might eliminate 1/3 of the existing vegetation, and replace those areas with impervious surfaces that would have zero evapotranspiration:




An additional way that the "impact" to instream flows is being overestimated is lack of recognition of well depth. The removal of vegetation that occurs during development will reduce shallow groundwater use. In contrast, groundwater wells are much deeper than the root zone, and so will withdraw water that recharges shallower aquifers through septic return flows. In some cases, water is provided to shallow groundwater areas that contribute to streamflow only because of the withdrawal by the well and septic recharge.

This combined effect of reduced vegetative evapotranspiration and deep-to-shallow recharge has been documented. For example, see USGS Conceptual Model and Numerical Simulation of the Groundwater-flow System of Bainbridge Island, Washington (2011) https://pubs.usgs.gov/sir/2011/5021/. The USGS document stated as follows:

"The calibrated model was used to simulate predevelopment conditions, during which no groundwater pumping or secondary recharge occurred and currently developed land was covered by conifer forests. *Simulated water levels in the uppermost aquifer generally were slightly higher at the end of 2008 than under predevelopment conditions, likely due to increased recharge from septic system returns and decreased evapotranspiration due to reduced forest land cover*." (Page 91) (Emphasis Added)

**3. Robinson & Noble Analysis re: Water Balance "Associated With" Rural Development**

Further, during the period of time after the Hirst decision, but prior to passage of ESSB 6091, some counties required additional analysis of water use associated with rural residential development. An example of this is in the attached water balance analysis provided by Robinson & Noble for an actual single-family residential development in Pierce County. The analysis calculates all changes in consumptive water use from the "pre-development" to "post-development" condition and estimates that the post-development condition will cause an increase in groundwater recharge of 485 gallons per day. This analysis is summarized in the report as follows:

"In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, will result in an increased to the amount of water recharging the subsurface. The resulting water balance of this project entirely offsets the consumptive use from the proposed well on the property and provides an increase in recharge as a result of the post-development condition." (Page 8)

*Robinson & Noble – Pierce County/Sullivan Project Water Balance Analysis* (Attachment A)

Robinson & Noble also prepared a similar analysis for Washington REALTORS®, based on an actual development in Thurston County. (*Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington,* Attachment B) This analysis is based on an actual 10-lot, 50 acre development. For this analysis, the area of forested/vegetation cover and associated consumptive water use was calculated in the pre-development condition, and compared to the area of outdoor irrigation and associated consumptive use, assumed indoor water use, and septic recharge. The analysis includes both a "high water use" scenario, based on assumptions developed by Ecology as part of the ESSB 6091 implementation, and a "moderate water use" scenario based on other reports (Culhane & Nazy, 2015; Golder, 2011).

For each lot, under the high water use scenario, groundwater recharge in the post-development condition increases by 277 gallons per day. In the moderate water use scenario, groundwater recharge increased by 1,041 gallons per day at each lot. The conclusion of the water balance analysis was summarized by Robinson & Noble as follows:

> "In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, results in an increase in the amount of water recharging the subsurface. *Our analysis suggests that the resulting water balance of the project like this, under either water use scenario, more than completely offsets the consumptive use from the proposed well on the property, providing an increased amount of groundwater recharge under the post-development condition*."

(*Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington, Page 5 – 6*) (Emphasis Added)

REALTORS® are not asking that the reduced water uses associated with vegetation removal be afforded any legal status as mitigation, or suggesting deforestation as a instream flow restoration strategy. Rather, if ESSB 6091 requires calculating and off-setting the "consumptive use impacts to instream flows associated with permit-exempt domestic water use" (RCW 90.94.020(4)(b)), then all actions – those that both increase and decrease groundwater use – should be part of the calculation. This more holistic and hydrologically honest framework would great decrease the supposed "impact" (and in some cases show a benefit) to instream flows – thereby supporting a rule amendment that more closely reflects water needs of rural residents.

**4. The Proposed Outdoor Use Limits Conflict With Legislative Intent, and Further the Trend of a Complicated and Hard to Implement Water Resource System**

RCW 90.94.020(8) states "This section only applies to new domestic groundwater withdrawals exempt from permitting under RCW 90.44.050 . . . " Under RCW 90.44.050, the exemption for single or group domestic use is one of four separate exemptions. One of the other exemptions in RCW 90.44.050, and one explicitly excluded from RCW Chapter 90.94, is for the irrigation of ½ acre non-commercial lawn or garden. Ecology's proposed rule conflicts with RCW 90.94.020(8) by including outdoor irrigation limits (1/12$^{th}$ of an acre) with the domestic limit of 500 gallons per day. In addition to conflicting with RCW Chapter 90.94, Ecology's "bundled" interpretation of RCW 90.44.050, combining multiple exempt uses into a single exemption, was rejected by the Washington Supreme Court in the Five Corners Family Farmers decision.

In that case, the Court stated:

> With collapse of the "bundle" interpretation, [Ecology's] argument that permit-exempt stock-watering withdrawals are limited to 5,000 gallons per day also fails. Accepting, as the sentence structure makes clear, that the exemption clause contains four distinct categories, it becomes apparent that each category is limited by its own qualifying language and only its own qualifying language. Given that the "five thousand gallons a day" limitation appears twice in the exemption clause, it is evident that the legislature knew how to attach that limitation to multiple categories, and yet it chose only to apply it to two categories. There is simply no textual basis for the conclusion that "five thousand gallons a day" modifies "for stock-watering purposes." RCW 90.44.050. Accordingly, Appellants' proposed interpretation is not reasonable.

*Five Corners Family Farmers v. Ecology*, 173 Wn.2d 296, 312–13 (2011).

By including outdoor irrigation limits, which cannot be attributed to any authority in RCW Chapter 90.94, Ecology is using the same "bundled" interpretation of RCW 90.44.050 rejected by the Supreme Court.

Further, beyond the legal interpretation, the 1/12$^{th}$ acre provision is an example of a regulatory provision that creates unnecessary complexity over a few small amount of water (and again, based on the Robinson & Noble analysis, perhaps even positive increases to groundwater recharge associated with new development). In the case of group domestic use, the total outdoor use is limited to ½ acre, regardless of the size of the group use.

Another example of unnecessary complexity is the drought curtailment provision in proposed WAC 173-501-065. In the event of drought, the rule would Ecology to determine whether outdoor uses are "noncommercial subsistence gardening purposes" – as opposed to (we assume?) lawns, trees, shrubs or gardens that are not necessary for subsistence. In drought events, Ecology should focus its efforts on larger water resource issues – both instream and out-of-stream, and not adopt regulations on homeowners whose impacts during normal or drought years are immeasurable.

## 5. Ecology's Proposed Rule Inconsistent With WDOH Group B Water System Rule

While the proposed amendments describe potential group domestic use, it is unclear whether the 500 gallon per day water use limit would even allow group domestic use. If not, this will result in the need to drill more wells, rather than fewer wells. The Washington Department of Health's Group B rule includes a water supply minimum source capacity of 750 gallons per day, per dwelling unit, for Whatcom County. WAC 246-291-125(4)(d), Table 1.

Washington REALTORS® suggest that 750 gallons per day, average annual use, for indoor use be the minimum quantity allowed under Ecology's amended rule. This would ensure consistency with WDOH's Group B, and ensure sufficient domestic water supply for larger families. Outdoor water use would be allowed in addition to this 750 gallon per day average annual use limit.

In addition, the change from ESSB 6091 in establishing gallon per day limits on an average annual basis, to having a daily 500 gallon per day maximum, further complicates the rule. An average annual GPD limit is easier to understand, implement, and enforce.

## 6. Ecology's Proposed Rule Inconsistent With GMA Rural Element

Ironically, Ecology's proposed rule is the product of the GMA decision (Hirst), overruled by the Legislature (ESSB 6091), and now ultimately resulting in an Ecology rule that is inconsistent with the GMA – which is exactly where this whole mess started. Under the GMA, "rural character" is defined to include patterns of land use "that foster traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas. RCW 36.70A.030(20)(b). The Department of Commerce's GMA rules further define the Rural Element of the GMA at WAC 365-196-425.

Whatcom County's GMA Comprehensive Plan states as follows:

> "Whatcom County's rural lifestyle is one where residents enjoy views of a green landscape dotted by homes and barns, and have an appreciation for clean water and air. Residents can work and shop in small rural communities, or earn a living on their own rural lands, but these enterprises do not detract from the overall sense of openness and predominance of the landscape in the rural area. Rural Whatcom County has long been a place to raise children with the values of hard work and responsible stewardship of the land, and where residents can grow food and livestock for themselves or for market. While rural property owners do not expect to be provided with urban-level services, they enjoy a quality of life and sense of self-sufficiency not ordinarily found in the urban areas."

The "traditional rural lifestyles" that the GMA describes necessitate sufficient water supply for outdoor water use – not 1/12th of an acre. Many people choose to live in rural areas so they have space – space for lawns, gardens, trees, animals, and other pursuits – all of which require outdoor water use. The analysis provided to Ecology by RH2 analyzing outdoor water use shows that on average, homeowners stay well under the ½ acre outdoor lawn and garden limit in RCW 90.44.050. Homeowners should be given this flexibility to irrigate up to ½ acre, and with realistic projections of actual water use impacts, this amount can be offset through projects funded by the Legislature.

**Attachments**:

A. Robinson & Noble – Pierce County/Sullivan Project Water Balance Analysis.

B. Robinson & Noble - Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington.

WASHINGTON REALTORS
TYPICAL RURAL LARGE LOT RESIDENTIAL
DEVELOPMENTS IN WESTERN WASHINGTON

NOVEMBER 29, 2018

by

Michael F. Piechowski, LHG
Principal Hydrogeologist

# Water-Balance Analysis
# Typical Rural Large Lot Residential Developments in Western Washington
# November 29, 2018

## Introduction and Scope

This narrative has been prepared for Bill Clarke and Washington REALTORS® documenting our water-balance analysis of typical rural large-lot residential developments in Western Washington. This evaluation is based on our analysis of an existing development in Thurston County (County) with ten adjacent 5-acre parcels and focuses on the changes to the total water balance as a result of development. This example is considered to have pre- and post-development conditions that are typical of rural, exempt well-based development in much of Western Washington.

Our approach used aerial imagery available from Thurston County and through Google Earth. We traced the outlines of the homes, driveways, roads, and cleared areas on each of the ten parcels, then calculated the relative areas of each parcel that changed from pre-development conditions (which appeared to be a second-growth forest based on the earliest aerial imagery reviewed). For this discussion, we presumed that each of the homes is served by an individual well and individual on-site septic system and calculated water use based on recent census data and regional studies.

## Site Setting and Topography

The study area is located near the northern margin of the Maytown Upland in Thurston County, south of Tumwater. The study area is situated on the southern margin of a small upland. The upland has an undulatory surface that was sculpted by the most recent continental glaciation. The features in this area generally trend from the north-northeast to the south-southwest, with lineations corresponding to the presumed direction of glacial motion. According to the USGS topographic quadrangle of the area, the site has an elevation of approximately 370 feet along the northern margin; the elevation steadily drops to 310 feet at the southern boundary of the study area.

General drainage patterns in the area tend to follow the local topography. This portion of the upland containing the study area generally slopes to the south, so surficial drainage generally flows to the south. The slope is relatively gentle, with approximately five feet of drop per hundred feet.

### Surface Water

The site is located in Water Resource Inventory Area 23, specifically within the Salmon Creek basin. The local surface water drainage is towards the south, but shifts to a more westerly direction approximately one mile south of the site. The nearest significant surface water is Pitman Lake, approximately 5,600 feet to the south. The nearest significant surface stream is the Deschutes River which is approximately 1.5 miles to the east of the property. However, the USGS quadrangle indicates a number of marshy areas in the low-lying regions to the south of the site and ephemeral tributary creeks to Salmon Creek beginning approximately 1,000 feet

east and west of the property. Salmon Creek is a tributary to the Black River, which flows into the Chehalis River, ultimately discharging to the Pacific Ocean at Grays Harbor.

### Soils and Vegetation

The study area is mostly covered with Alderwood gravelly sandy loam with 8 to 15 percent slopes; a small portion of the site near the southern boundary has steeper slopes (US Department of Agriculture, Soil Conservation Service). The Alderwood gravelly sandy loam is a moderately well-drained soil. It forms on the top of glacial drift and generally has a dense low-permeability layer that restricts infiltration within 39 inches of land surface. This soil is considered to be a part of Hydrologic Group B and is not considered a hydric soil.

## Site Geology

Site geology was determined by reviewing published geologic maps of the region. Logan (2009) mapped the site and surrounding area as Vashon till, which is a highly-compacted mixture of sand, gravel, silt, and clay that was deposited beneath and overridden by the latest continental glaciation. Typically, till has a relatively low permeability, though it may vary locally based on the composition and the degree of compaction. Review of nearby water well reports suggests that the till is generally over 50 feet thick in the area.

## Water Balance Analysis

To assess potential post-development changes to the water balance of the groundwater and surface water systems in the area, we completed a water-balance evaluation of the property and proposed development on an annualized basis. This analysis concentrated on the changes to the property from the pre-development conditions (mature second-growth forest). We analyzed two water use scenarios.

The first water use scenario is based on the Washington State Department of Ecology (Ecology) guidance document, ESSB 6091 Streamflow Restoration Recommendations for Water Use Estimates. The water use estimates from Ecology's ESSB 6091 guidance document are higher than other water use estimates used by Ecology or in other studies, but are used for purposes of this analysis as the "High Water Use Scenario." Under the High Water Use Scenario, Ecology uses an average value of 60 gallons of indoor water use per day (gpd) per capita, a household size of 2.5 persons, and consumptive use of 10%. This results in 0.017 acre-feet per year (AF/year) of indoor consumptive water use. Ecology uses a figure of 0.39 AF/year of outdoor consumptive water use. This totals 0.407 AF/year of consumptive use, which averages to 363 gallons per day.

The second water use scenario is based on water use estimates that more closely track prior Ecology water use estimates, though are still conservative and so would tend to overestimate, rather than underestimate, consumptive water use. The second scenario is referred to in the analysis as "Moderate Water Use Scenario." Under this second scenario, water use is based on an average value of 66 gallons of indoor water use per day (gpd) per capita (Welch, 2014). Welch (2014) estimates outdoor water use per capita at 4, 29, 60, 86, 97, and 30 gpd for May, June, July, August, September, and October, respectively. Outdoor water use is presumed to be zero gpd per capita for the rest of the year. The Ecology guidance document uses 2.5 people per residence, so we used that same value in the Moderate Water Use Scenario. This value is consistent with the US Census, which calculated an average of 2.54 persons per household in Thurston County. The per-capita water use numbers listed above were multiplied by 2.5 to calculate total household use. With indoor consumptive use of 10% and outdoor consumptive use

of 80%, the moderate water use scenario uses 0.018 AF/year as consumptive indoor use and 0.057 AF/year as outdoor consumptive use, for a total annual consumptive use of 0.076 AF/year, or about 68 gallons per day on average.

Under both scenarios, we presumed that water was withdrawn from a single private well on each parcel, with waste water dispersed via an on-site septic system for each parcel. The total water use (includes both consumptive and non-consumptive uses) in the Moderate Water Use Scenario is 0.25 AF/year. The daily use amounts in this scenario are approximately double those presented in Culhane and Nazy (2015) and Golder (2013), but these amounts were used in order to complete a conservative analysis. The total water use under the High Water Use Scenario, based on the ESSB 6091 Guidance Document is 0.67 AF/year, which is over 2.5 times more than the Moderate Use Scenario, and approximately five times that presented in Culhane and Nazy (2015) and Golder (2013).

Culhane and Nazy (2015) state that indoor use is only 10% consumptive, the remaining 90% is returned via septic infiltration, and that residential outdoor use is considered to be 80% consumptive, with 20% returned via infiltration. Other sources, such as Savoca (2010) suggest outdoor return flow can be as high as 40%. To stay conservative in our approach, we used the 80% consumptive value.

We used information presented in Drost (1999) to determine the rainfall and infiltration rate of the site. Based on information presented in Figures 4, 16, and 17 of Drost (1999), the study area receives 48 inches of rainfall, with 18 inches of that resulting in recharge to the aquifers beneath the site.

In a typical large-lot residential development, a portion of the lot is cleared for development and a home and driveway are constructed, adding impermeable surfaces to the property and potentially increasing runoff. In some cases, outbuildings such as garages, shops, or barns are also added. In Thurston County, site development is currently held to the standards presented in Chapter 15.05 of the Thurston County Code (County Code) and the 2016 Edition of the Drainage Design and Erosion Control Manual for Thurston County (Manual).

These standards require infiltration or dispersion of stormwater falling on impervious surfaces, with the intent to reduce runoff and erosion and enhance recharge to the subsurface. Additionally, per the County Code and the Manual, any disturbed soil must be amended to enhance infiltration, which will also serve to reduce runoff from the site. Studies indicate a significant increase in the infiltration rate of tilled, compost-amended soils (Brown and Cotton, 2011; Kays, et al, 2015). This is generally consistent with language in ESSB 6091 providing that "an applicant shall manage stormwater runoff on-site to the extent practicable by maximizing infiltration, including using low-impact development techniques, or pursuant to stormwater management requirements adopted by the local permitting authority, if locally adopted requirements are more stringent."

In a typical project, site development activities will be confined to the area immediately surrounding the home and outbuildings, septic drainfield, driveway, and yard. Figure 1 presents an aerial image of the ten parcels in essentially their current condition. Figure 2 presents a historical aerial image from 1996 when only three of the sites were developed or under development and, what appears to be, second-growth forest covering the remaining seven parcels. Based on our analysis of the development pattern of these ten parcels, an average of 75,200 square feet of each lot was cleared for construction and landscaping, or approximately 34% of a 5-acre lot. Within the cleared area, approximately 16,900 square feet of impermeable surfaces (buildings

and driveways) were added, approximately 8% of a 5-acre lot. The remaining cleared area (approximately 58,300 square feet, or 27% of a 5-acre lot, was generally converted to lawn and landscaped areas.

We have presumed that the soils disturbed during the clearing, grading, and development of the site were amended, tilled, and graded in accordance with County Code and Manual requirements. We have also presumed that water falling on impervious surfaces added during development will be infiltrated on site. The change from mature trees to grass lawn results in a reduced amount of canopy capture and evapotranspiration, the magnitude of this reduction is approximately 20% (Zhang, et al, 2004; Sanford and Selnick, 2013).

Additionally, where impervious surfaces, such as the house and driveway, occur no vegetation will grow and the evapotranspiration will be nearly zero. To be conservative, we estimate the evapotranspiration will decline in these areas by 90%.

The pre-development water balance of the property can be calculated using the following factors: precipitation, runoff, evapotranspiration, and recharge. The relationship between these factors can be described as follows:

$$N_P - N_R - N_{ET} = Recharge$$

Where:

$N_P$ = *Precipitation*

$N_R$= *Runoff*

$N_{ET}$= *Evapotranspiration*

In the pre-development condition, the site receives 48 inches of precipitation (Drost, 1999). Evapotranspiration in Thurston County is generally estimated at 18 inches per year (Biever, 2017). Based on the surface geology, recharge is estimated at 18 inches per year (Drost, 1999), so the remaining 12 inches must be considered runoff.

The post-development condition is somewhat more complicated, as the consumptive use calculated earlier must be accounted for and the changes in the nature of the site must be evaluated. Precipitation remains unchanged. Approximately 65% of the 5-acre lot will also remain untouched. Therefore, this analysis only focuses on the portion of the lot that was changed during site development—the 35% of the area that was cleared during construction. Homes, outbuildings, and driveways were added, though compliance with current County stormwater requirements means that the water falling directly on these impermeable surfaces will be re-routed and infiltrated into the subsurface. These impervious surfaces will cover about 8% of a 5-acre lot.

The nature of the ground cover changed from mature trees to a grass lawn where the yard, drainfield, and reserve drainfield are located, other cleared areas were landscaped. This results in a commensurate decrease in evapotranspirative demand discussed earlier. However, in order to keep our analysis conservative, we elected to use three quarters of the earlier-stated decrease (15%). As stated earlier, for the impervious areas, the evapotranspiration rate will be reduced by approximately 90%. The amended soils in this area will have an enhanced infiltration capacity and will more readily accept rainfall, and County regulations require infiltration and dispersion of runoff, significantly reducing runoff from this portion of the property. As a conservative value, we reduced runoff by a quarter, to a value of nine inches per year.

Septic return flow will offset some of the water use on the property. Typically, 90% of the indoor use is considered to be returned to the drainfield (Culhane and Nazy, 2015, and Washington State Department of Ecology, 2018). However, we applied an evapotranspirative loss factor (ranging from 10% in May up to 30% in July and August) to the septic effluent return flow, as laterals may be within reach of plant and turf roots, resulting in the uptake of some of the effluent during hotter months. Finally, the water used outdoors is considered to be a largely consumptive use, with only 20% infiltrated into the subsurface (Culhane and Nazy, 2015).

With these factors, we are able to calculate a post-development water budget via the following relationship:

$$N_P - N_R - N_{ET} - N_{WW} + N_{OR} + N_{SR} = Recharge$$

Where:

$N_P$ = *Precipitation*

$N_R$= *Runoff*

$N_{ET}$= *Evapotranspiration*

$N_{WW}$= *Well Withdrawal*

$N_{OR}$= *Outdoor Use Return Flow*

$N_{SR}$= *Septic Return Flow*

The results of this calculation are presented in Table 1.

**Table 1: Pre- and post-development annual average water balance**

| Pre-development | | | Post Development (High Water Use, using Ecology's ESSB 6091 guidance) | | Post Development (Moderate Water Use) | |
|---|---|---|---|---|---|---|
| | in/yr | gal/day | in/yr | gal/day | in/yr | gal/day |
| Precipitation | 48 | 6,164 | 48 | 6,164 | 48 | 6,164 |
| Runoff | -12 | -1541 | -9 | -1156 | -9 | -1156 |
| Evapotranspiration(1) | -18 | -2,312 | -11.6 | -1486 | -11.6 | -1486 |
| Well Withdrawal | 0 | 0 | -11.7 | -597 | -4.5 | -229 |
| Septic Return | 0 | 0 | 2.6 | 135 | 2.9 | 149 |
| Outdoor Return | 0 | 0 | 1.7 | 89 | 0.3 | 13 |
| Recharge | 18 | 2,312 | 20.0 | 2,589 | 26.1 | 3353 |
| | | | Total Change | 277 | | 1041 |

[1] Reduction prorated for combination of pervious and impervious surfaces

In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, results in an increase in the amount of water recharging the subsurface. Our analysis suggests that the resulting water balance of a project like this, under either water use scenario, more than completely

offsets the consumptive use from the proposed well on the property, providing an increased amount of groundwater recharge under the post-development condition.

*Seasonal Consideration*

Under Ecology's ESSB 6091 water use estimates, the annual water balance indicates a 277 gallon per day increase per lot in average groundwater recharge. Using the lower water use estimates, as published by Culhane and Nazy (2015) and Golder (2013), the annual water balance indicates a 1,041 gallon per day increase per lot in average recharge due to the development.

However, these increases in groundwater recharge do not occur evenly over the year. The increase in recharge due to the reduction in runoff will occur mainly in the wet season. The reduction in evapotranspiration will occur mostly in the dry season. Water use, and consequently well production, will be higher in the dry season. Return from outdoor water use will occur mainly in the dry season. Returns from indoor use will occur year-round, largely unaffected by the seasonal changes in outdoor use.

If we consider the dry season to occur from May and October, assign the changes in water balance between wet and dry seasons accordingly, and presume that all the changes in recharge occur during this season, we can develop an approximate change in recharge for the dry season as shown on Table 2.

Table 2: Dry season change in recharge

| | High Water Use | Moderate Water Use |
|---|---|---|
| | gal/day | gal/day |
| Precipitation | 0 | 0 |
| Runoff reduction | 0 | 0 |
| Evapotranspiration reduction | 826 | 826 |
| Well Withdrawal [1] | -1037 | -292 |
| Outdoor Return | 89 | 13 |
| Septic Return [2] | 135 | 149 |
| **Total Change** | 13 | 695 |

[1] Average well production from May through October
[2] Average septic return flow from May through October

The effects of both the well production and the recharge will be attenuated relative to aquifer discharges to surface water due to both vertical and horizontal distance and the fact that the aquifers have substantial storage. Timing of recharge entering the aquifer will be attenuated by the sediments between the land surface and the aquifer. However, as indicated by Table 2, the increase in recharge even during the dry season should be larger than the consumptive use. Because of attenuation effects, the system should act largely in a steady-state manner. And certainly, any transient analysis on a time period shorter than wet and dry seasons is not warranted.

## Conclusion

Based on our analysis of the historical development of ten five-acre lots, we have concluded that the consumptive water use and groundwater withdrawals of such a typical development are more than completely offset by the changes in evapotranspiration, reduction in runoff, and

the septic return flows associated with the development. The year-round net annual water balance in the post-development condition is positive and results in additional infiltration to the subsurface.

*The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted environmental and hydrogeologic practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Bill Clarke and Washington REALTORS®. Unless specifically stated in the document, no warranty, expressed or implied, is made.*

## Attachments

Figure 1 – Current Aerial Map
Figure 2 – Historical Aerial Map

## References


Biever, M., 2017, Water year report summary of Thurston County precipitation, groundwater, stream and lake data from October 2016 to September 2017, Thurston County Water Resources – Environmental Monitoring Program: https://www.thurstoncountywa.gov/sw/swmonitoringdocuments/Water%20Year%202017%20Final%20Report.pdf

Brown, S. and Cotton, M. 2011, Changes in soil properties and carbon sequestration potential as a result of compost or mulch application: results of on-farm sampling: http://faculty.washington.edu/slb/docs/SBrown_compost_farmsoils_final.pdf

Culhane, T. and Nazy, D., 2015, Permit exempt water use in Washington State: Water Resources Program, Washington State Department of Ecology

Drost, B.W., Ely, D.M., and Lum II, W.E., 1999, Conceptual model and numerical simulation of the ground-water-flow system in the unconsolidated sediments of Thurston County, Washington: U.S. Geological Survey Water-Resources Investigations Report 99-4165, 254 p.

Golder Associates, 2013, Skagit County exempt well metering program – 2012-2013, March 27, 2014: https://www.skagitcounty.net/PublicWorksNaturalResourcesManagement/Documents/Skagit%20County%20Exempt%20Well%20Metering%20Program%20--%202012-2013.pdf

Kays, B.L., et al, 2015, Amending soils for enhanced infiltration of stormwater: International Low Impact Development Conference 2015, LID: It Works in All Climates and Soils, edited by Michael Barrett, p. 123-132

Logan, R. L., et al, 2009, Geologic map of the Maytown 7.5-minute quadrangle, Thurston County, Washington, Washington Division of Geology and Earth Resources Geologic Map GM-76, scale 1:24,000

Sanford, W. E. and Selnick, D. L., 2013, Estimation of evapotranspiration across the conterminous United States using a regression with climate and land-cover data: Journal of the American Water Resources Association (JAWRA), vol.49, issue 1, p. 217–230

US Census Bureau QuickFacts: http://www.census.gov/quickfacts/table/PST045216/53053,00

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Washington Agricultural Experiment Station, Soil survey of Thurston County area, Washington: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

United States Geologic Survey, 2017, 7.5-Minute topographic quadrangle, Maytown, Washington, scale 1:24,000

Washington Department of Ecology, 2018, ESSB 6091 – Streamflow Restoration Recommendations for Water Use Estimates, Publication No. 18-11-007, June 2018.

Welch, W.B., et al, 2014, Hydrogeologic framework, groundwater movement, and water budget of the Kitsap Peninsula, west-central Washington: United States Geological Survey Scientific Investigations Report 2014-5106

Zhang, L., K. Hickel, W. R. Dawes, F. H. S. Chiew, A. W. Western, and P. R. Briggs, 2004, A rational function approach for estimating mean annual evapotranspiration: Water Resources Research, vol. 40, W02502, doi:10.1029/2003WR002710

# ATTACHMENTS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Note: Imagery from Thurston County GIS 2015 Aerials

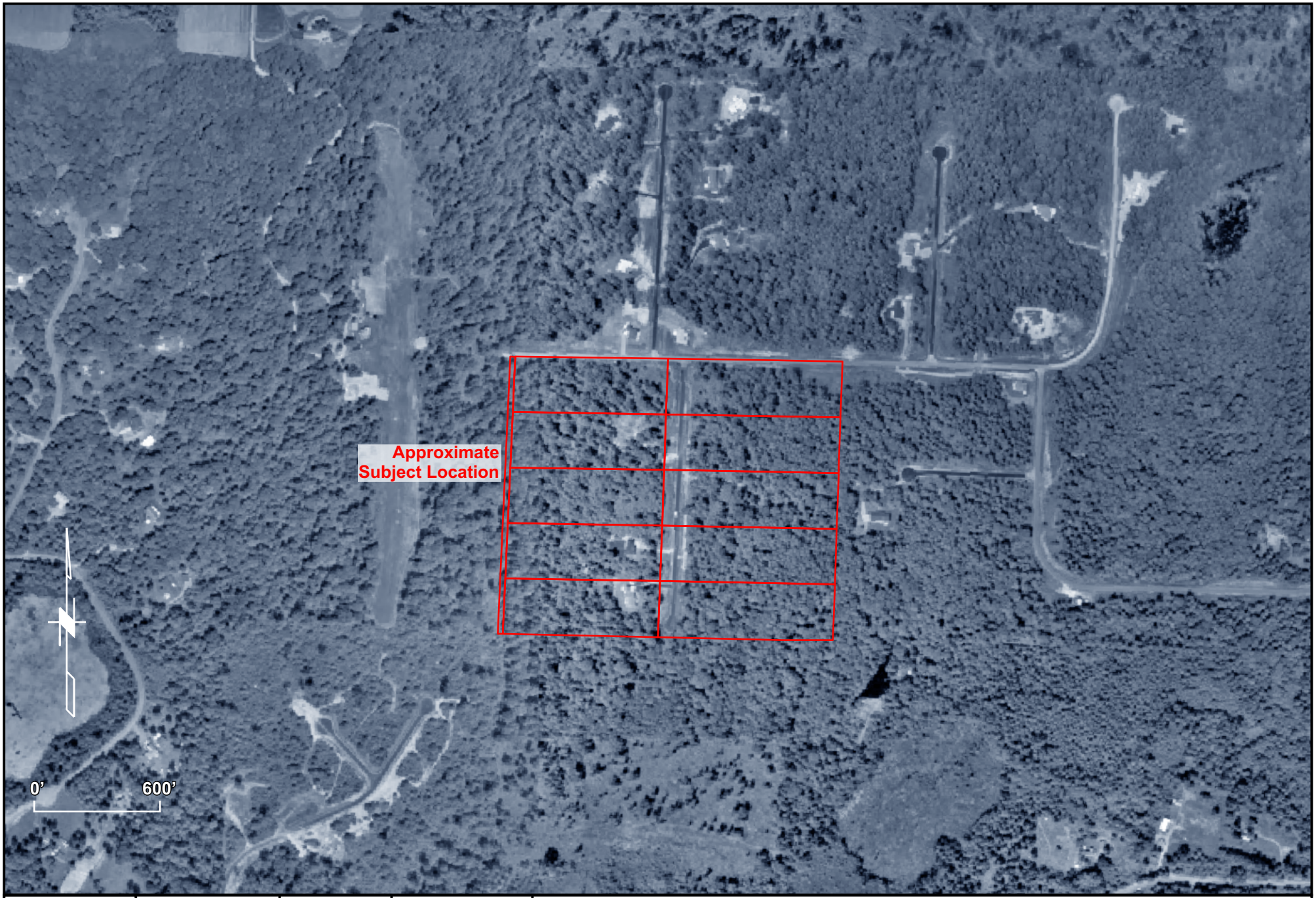
PM: MFP
November 2018
3321-001A

Thurston County
T 17 N/R 02 W - 25
Scale 1” = 600’

Figure 1

## Current Aerial Map

Washington Realtors: Water Balance Analysis




ROBINSON NOBLE

Note: Imagery from Thurston County GIS 1996 Aerials

PM: MFP
November 2018
3321-001A

Thurston County
T 17 N/R 02 W - 25
Scale 1” = 600’

Figure 2

# Historical Aerial Map

Washington Realtors: Water Balance Analysis

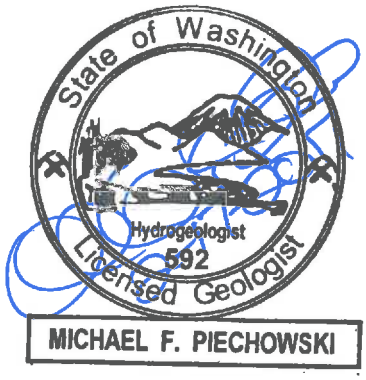
ROBINSON
NOBLE

# JULIANN AND PAT SULLIVAN
# HYDROGEOLOGIC ASSESSMENT
# 15712 28TH AVENUE NORTHWEST
# PIERCE COUNTY PARCEL 0222171053

FEBRUARY, 2017

by

Michael F. Piechowski, LHG
Principal Hydrogeologist

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# Pat and Juli Sullivan
# Pierce County Parcel 0222171053
# 15712 28th Avenue Northwest
# Hydrogeologic Assessment
# February 17, 2017

## Introduction and Scope

This assessment has been prepared for Pat and Juli Sullivan to meet the requirements stated in Pierce County Policy Number DW2016-02, which requires a hydrogeologic assessment to determine if the proposed exempt well for a building project "impacts or impairs a senior water rights holder, and impacts or impairs established instream flows and closures as identified by the State." This policy is applicable in certain areas of Pierce County including portions of the Kitsap Watershed (WRIA 15). The site is located within the Crescent Valley drainage, an area that is seasonally closed to surface water appropriations, so it is included in this policy.

The site is located on the western side of 28th Avenue NW, north of Gig Harbor, Washington in unincorporated Pierce County. This area is within the Kitsap Watershed. The street address is 15712 28th Ave. NW, the Pierce County tax parcel number is 0222171053. The surrounding properties are generally developed with single-family residences on large lots. Figure 1 presents a site map, including the boundaries of the parcel and the location of wells evaluated for this assessment.

We understand that the proposed project involves the construction of a three-bedroom single-family residence to be served by an individual well and septic system. We reviewed a provided plat plan, wetland delineation report, and septic design for the proposed project. The proposed well is located on the parcel such that the 100-foot sanitary control radius does not overlap the planned septic drainfield or reserve area. The sanitary control radius does extend onto the neighboring property to the east, but a signed affidavit from that landowner has been filed with the County, so no well variance is required.

## Site Setting and Topography

The site is located in the in the Crescent Valley area, on an upland above Crescent Lake, the source of Crescent Creek. The upland has an undulatory surface that was sculpted by the most recent continental glaciation. The features in this area generally trend from the north-northeast to the south-southwest, with lineations corresponding to the presumed direction of glacial motion. The property has a rectangular shape, 325 feet in a north-south direction, and 650 feet in an east-west direction. According to the USGS topographic quadrangle of the area, the site has an elevation of approximately 355 feet along the eastern margin, then with a gentle drop to 345 feet approximately 1/3 to the way to the western margin, then the elevation rises to 370 feet at the western margin.

We recently visited the site. No standing water was observed on the eastern portion of property, nor was any standing water observed in septic test pits on the property. The site is covered with mature trees, a mix of coniferous (Douglas fir, western red cedar, and hemlock) and

deciduous (red alder and big-leaf maple). The understory was fairly clear, though some salal and blackberry were observed. At the time of our site visit, the home site and a portion of the proposed drainfield were partially cleared and the home location staked out. It may be necessary to remove additional trees within the footprint of the home, driveway, and septic drainfield to develop the property as planned.

General drainage patterns in the area follow the local topography. The upland containing the property generally slopes to the southeast, and the site is situated across a slight valley that drains to the south, so surficial drainage generally flows to the south towards Crescent Lake and Crescent Creek.

### Surface Water

The site is located in Water Resource Inventory Area 15, specifically within the Crescent Creek basin. The local surface water drainage is towards the south. The nearest significant surface water is Crescent Lake, approximately 3,200 feet to the southeast. The nearest significant surface stream is Crescent Creek which is approximately 4,500 feet to the south of the property, though the USGS quadrangle shows a small tributary creek to Crescent Lake beginning approximately 2,000 feet directly south of the property. During periods of significant runoff, it is likely this small creek has an ephemeral appearance on the property. Crescent Creek flows out of Crescent Lake toward the south and discharges into Puget Sound at Gig Harbor.

### Soils and Vegetation

The five-acre site is mostly covered with the Harstine gravelly ashy sandy loam with 6 to 15 percent slopes, a small portion of the site near the western boundary has steeper slopes (US Department of Agriculture, Soil Conservation Service). The Harstine loam is a moderately well-drained soil. It forms on the top of sandy glacial drift and generally contains volcanic ash. This soil is considered to be a part of Hydrologic Group C and is not considered a hydric soil. Our observations of the material on site are consistent with the soil survey data; we observed a tan to brown gravelly, sandy silty loam with occasional larger cobbles. Soils information is presented in Appendix A.

## Site Geology

Site geology was determined by reviewing published geologic maps of the region. Booth and Troost (2005) map the site and surrounding area as the Vashon till, which is a highly-compacted mixture of sand, gravel, silt and clay that was deposited beneath and overridden by the latest continental glaciation. Typically, till has a relatively low permeability, though it may vary locally based on the composition and the degree of compaction. Review of nearby water well reports suggests that the till is generally over 50 feet thick in the area.

## Conceptual Hydrogeologic Understanding

To better understand the relationships between aquifers, confining units, groundwater, and surface water features, we developed a conceptual model of the study area. The site is located on the eastern margin of the glaciated upland that forms the Kitsap Peninsula. Puget Sound borders the peninsula to the east, south, and southwest, and glaciated upland plains extend to the north and west towards Sinclair Inlet and Hood Canal, respectively.

The top of the upland is capped with the Vashon till, which forms a relatively low-permeability confining unit. A thin veneer of Vashon outwash deposits may be locally present over the top of the till, but in the vicinity of the site, the till is present at the surface. Geologic maps and well

logs suggest the thickness of the till is at least 90 feet in the vicinity of the site. The till surface is gently rolling; there are lineations that trend north-northeast to the south-southwest, corresponding to the presumed direction of glacial motion.

The Vashon advance outwash (Qva) sand is present beneath the till. Pre-Vashon deposits are not specifically named in Welch (2014) or Booth and Troost (2005), but rather are described texturally. For the purposes of this study, the descriptions in Welch will be used, with no discussion of deposits deeper than the sea level Aquifer (QA1), as the deepest wells reviewed do not even reach sea level. The unconsolidated sediments in this portion of Pierce County exceed 1,000 feet thick.

The first principal aquifer in the region is a confined aquifer formed in the Vashon advance outwash sand. The Vashon advance outwash sand is well-sorted sand with occasional gravel; it may also contain silty zones. While it may be unconfined, a review of well logs completed within the advance sand suggest that it is fully saturated in this area, and therefore, is confined in this area. Its thickness ranges from 20 to 240 feet, averaging 85 feet in the Kitsap Peninsula area (Welch, 2014).

Well logs from the area around the property indicate the Vashon advance outwash generally has two zones of sand and gravel separated by silty zone (clay is sometimes described as well, though the presence of true clay in Vashon outwash sediments should be limited). It appears most well require drilling into the deeper zone to find an adequate supply.

A deeper aquifer also exists in the area. Welch identifies this deeper aquifer the sea level aquifer (QA1) (Welch, 2014). Typically, it is separated from the advance sands by a thick clay or silt. The aquifer material is typically described as water-bearing sand, occasionally having some gravel.

The Vashon advance outwash is exposed at lower elevations where valleys have been eroded through the till. The valley containing Crescent Lake and Crescent Creek have significant outcrops of the Vashon advance outwash. Spring discharge and seepage is common along the walls of these valleys. The valleys floors are covered with the Vashon recessional outwash, which is a coarser sand and gravel deposited by glacial meltwater as the glaciers retreated.

As the aquifer deposits within the Vashon advance outwash and the QA1 have a significant regional extent in this watershed, recharge to the aquifers results from the infiltration of precipitation throughout the region, and gradients tend to be regionally influenced. The general flow direction within the Qva aqufier is towards the south in the vicinity of the site. The flow in the QA1 aquifer is southeasterly toward Colvos Passage (Welch, 2014).

Though some water undoubtedly runs off the upland via surface drainage, a significant portion infiltrates where slopes are not extreme or where it is captured in depressions. A portion of this water discharges as spring flow along the valley walls, but some fraction infiltrates deeper and is the fundamental mechanism for aquifer recharge. Based on the observed head relationship between the noted aquifer zones, some portion of the water in the shallower zone infiltrates and provides recharge to the deeper aquifer systems evaluated.

The discharge points for the shallow Qva aquifer include springs and seepage along the valley containing Crescent Lake and Crescent Creek to the south of the property and to Colvos Passage coastline to the east. The site straddles a small valley within the upland, so surficial runoff and shallow groundwater are presumed to also flow in a southerly direction towards Crescent Lake and Crescent Creek. Given the relative elevations, there isn't a local discharge point for

the QA1 aquifer system. Based on groundwater flow information presented in Welch and our regional understanding of groundwater flow, the QA1aquifer generally flows in east-southeasterly and discharges in Colvos Passage (Welch, 2014).

## Well Analysis

As described above, there are several aquifers in the region that supply water to domestic wells. We reviewed well logs in the vicinity of the proposed project, geocoding the well locations to the degree possible given the information on the water well reports. We also evaluated the stratigraphic logs and well completion information to determine depths and type of aquifer present near this location.

Well depths in the vicinity range from 53 to 218 feet deep. Of the 39 wells evaluated for this study, 14 are located within 1,500 feet of the proposed well. These were analyzed further, and the logs of these wells are included in Appendix B. Of these, 3 are completed at approximately 55 feet deep and 3 are completed at around 100 feet; these are all completed in the Qva aquifer. The remaining 6 are completed in the deep QA1aquifer, found at 170 feet. The depths to water are typically 20 to 50 in the shallow aquifer and around 90 feet in the deeper system. This increasing depth to water (decreasing head with increasing depth) indicates that this area is an aquifer recharge area.

We calculated aquifer characteristics using the pumping test information recorded on the logs following the methods described in Welch (2014). When the water well report included information from a pump or bailer test, we calculated aquifer transmissivity via the modified Theis formula presented in Ferris (1962). In cases where the well was tested with an air test, we used the equation developed by Bear (1979) to calculate a hydraulic conductivity for the aquifer material, then calculated aquifer transmissivity by multiplying the calculated hydraulic conductivity by the thickness of the water-bearing deposit. Aquifer parameters were tabulated, then averaged. At this location, it is apparent that two separate aquifer zones are present, we so we calculated average values for each aquifer.

Table 1: Wells within 1,500 feet

| Well ID | Tag | Radial Distance (ft) | Depth (ft) | Depth to Water (ft) | Aquifer Zone | Theis Transmissivity (gpd/ft) | Bear Transmissivity (gpd/ft) |
|---|---|---|---|---|---|---|---|
| 358079 | ABA-064 | 250 | 102 | 65 | Qva | 679 | |
| 55131 | ABP-815 | 390 | 178 | 107 | QA1 | 1490 | |
| 55134 | ABP-828 | 460 | 119 | 72 | Qva | 5580 | |
| 509961 | BAT-439 | 540 | 148 | 83 | QA1 | 1042 | |
| 1568113 | BIY-098 | 680 | 98 | 40 | Qva | 1931 | |
| 1568407 | BJN-278 | 820 | 151 | 74 | QA1 | 1051 | |
| 511663 | APR-640 | 890 | 160 | 108 | QA1 | 2297 | |
| 43804 | | 920 | 90 | 45 | Qva | 2988 | |
| 47822 | | 1030 | 86 | 46 | Qva | 863 | |
| 52826 | | 1060 | 53 | 20 | Qva | 2097 | |
| 583877 | ABG-626 | 1065 | 53 | 22 | Qva | | 2513 |
| 48908 | | 1120 | 161 | 90 | QA1 | 3621 | |

| Well ID | Tag | Radial Distance (ft) | Depth (ft) | Depth to Water (ft) | Aquifer Zone | Theis Transmissivity (gpd/ft) | Bear Transmissivity (gpd/ft) |
|---|---|---|---|---|---|---|---|
| 360212 | AGE-533 | 1480 | 218 | 92.5 | QA1 | 568 | |
| 48966 | | 1490 | 63 | 25 | Qva | 1117 | |

The shallow aquifer transmissivity values average approximately 2,100 gallons per day per foot of aquifer width (gpd/ft), though wells in the shallower portion of the aquifer show a slightly smaller transmissivity at about 1,900 gpd/ft and those in the deeper portion a slightly higher value averaging around 2,400 gpd/ft. The deep aquifer has an average transmissivity of about 1,700 gpd/ft.

Using these values, we evaluated the potential for the new well to impair existing wells by calculating the interference drawdown for each of the neighboring wells as a result of the proposed new well. The Theis equation (Theis, 1935) for calculating steady-state drawdown at a radial distance was used, though due to the scarcity of data, we relied upon an assumed storage coefficient of 0.0001, as used by Welch (2014), which, though conservative, is an appropriate value for confined sand and gravel aquifer materials.

We selected a pumping rate based on information tabulated in Welch (2014). The evaluation of 27 years of water use in the Kitsap Peninsula indicates that indoor use averages 66 gallons per day (gpd) per person. Outdoor use ranges from 0 to a maximum of 97 gpd per person depending on the month, and we calculated an average of 61 gpd for the 6-month growing season (May through October). The US Census calculated an average of 2.65 persons per household in Pierce County, so the per-person water use numbers were multiplied by this amount. These calculations indicate an indoor water use, growing-season outdoor water use, and total water use of 175, 162, and 337 gpd, respectively. These values are approximately double those presented in Culhane and Nazy (2015) and Golder (2013), but were used to complete a conservative analysis. Culhane and Nazy (2015) state that indoor use is only 10% consumptive, the remaining 90% is returned via septic infiltration, and that residential outdoor use is considered to be 80% consumptive, with 20% returned via infiltration. Other sources, such as Savoca (2010) suggest outdoor return flow can be as high as 40%. To stay conservative in our approach, we used the 80% consumptive value.

A rate of 337 gpd was selected to calculate the potential for impact during the highest-use period. Under steady-state conditions, this equates to slightly more than 0.2 gallons per minute (gpm). Using the equations presented in Theis (1935), we calculated the predicted drawdowns at each of the wells within 1,000 feet of the proposed well after 184 days (May – October) of continuous pumping, representing the conditions at the end of the summer season.

Table 2: Predicted drawdown after 100 days of pumping

| Well ID | Tag | Radial Distance (ft.) | Aquifer | Predicted Drawdown (ft.) |
|---|---|---|---|---|
| 358079 | ABA-064 | 250 | Qva | 0.11 |
| 55131 | ABP-815 | 390 | QA1 | 0.14 |
| 55134 | ABP-828 | 460 | Qva | 0.10 |
| 509961 | BAT-439 | 540 | QA1 | 0.13 |
| 1568113 | BIY-098 | 680 | Qva | 0.09 |

| Well ID | Tag | Radial Distance (ft.) | Aquifer | Predicted Drawdown (ft.) |
|---|---|---|---|---|
| 1568407 | BJN-278 | 820 | QA1 | 0.12 |
| 511663 | APR-640 | 890 | QA1 | 0.11 |
| 43804 | | 920 | Qva | 0.08 |
| 47822 | | 1030 | Qva | 0.08 |
| 52826 | | 1060 | Qva | 0.10 |
| 583877 | ABG-626 | 1065 | Qva | 0.10 |
| 48908 | | 1120 | QA1 | 0.11 |
| 360212 | AGE-533 | 1480 | QA1 | 0.10 |
| 48966 | | 1490 | Qva | 0.09 |

The nearest well in the upper portion of the Qva aquifer is 1,060 feet away. The conservative 184-day prediction results in 0.10 feet of drawdown at this radial distance, which does not represent an impairment in a well with over 30 feet of available drawdown. The nearest well in the deeper portion of the Qva aquifer is 250 feet away. A similar calculation predicts a drawdown of 0.11 feet. Similarly, this does not represent an impairment, as wells completed in the deeper portion of the Qva typically have over 50 feet of drawdown available. The nearest well in the deep QA1 aquifer is 390 feet away. The predicted drawdown at this location is 0.14 feet, which does not represent an impairment in a well that has over 70 feet of available drawdown. These small values of predicted drawdown approach the accuracy limit of the Theis approach as applied to the available dataset.

## Water Balance Analysis

To assess impacts to Crescent Lake and Creek and other surface waters in the area, we completed a water balance evaluation of the property and proposed development on an annualized basis. This analysis concentrated on the changes as a result of the proposed project from the pre-development conditions.

We used information presented in Garling and Molenaar (1965) and Welch (2014) to determine the rainfall and infiltration rate of the site. Based on those publications, the site and surrounding area receive 48 inches of rainfall, with 14.5 inches of that resulting in recharge to the aquifers beneath the site

As we understand the project, there will be a home and driveway constructed on the eastern margin of the site, forming impermeable surfaces and potentially increasing runoff. In Pierce County, site development is held to the standards presented in Title 17A of the Pierce County Code and the Pierce County Stormwater Management and Site Development Manual, these require infiltration or dispersion of stormwater falling on impervious surfaces, with the intent to reduce runoff and erosion and enhance recharge to the subsurface. Additionally, per the County Code and Manual, any disturbed soil must be amended to enhance infiltration, which will also serve to reduce runoff from the site. Studies indicate a significant increase in the infiltration rate of tilled, compost-amended soils (Brown and Cotton, 2011; Kays, et al, 2015).

As we understand the project, site development activities will be confined to the area immediately surrounding the proposed home, septic drainfield, driveway, and yard. As planned, there will be several fir and alder trees removed, but incidental clearing will be limited to the eastern portion of the property. For the purposes of this assessment, we have calculated that no clearing or grading will take place further west than the edge of the mapped wetland buffer, yielding

a project area of approximately 30,000 square feet. We have presumed that the soils disturbed during the clearing, grading, and development of the site will be amended, tilled, and graded in accordance with County Code and Manual requirements. We have also presumed that all water falling on impervious surfaces added during development will be infiltrated on site. The change from mature trees to a grass lawn in this area of the property will result in a reduced amount of canopy capture and evapotranspiration, the magnitude of this reduction is approximately 20% (Zhang, et al, 2004; Sanford and Selnick, 2013).

Additionally, where impervious surfaces, such as the house and driveway, occur no vegetation will grow and the evapotranspiration will be nearly zero. To be conservative, we estimate the evapotranspiration will decline in these areas by 90%.

The pre-development water balance of the property can be calculated using the following factors: precipitation, runoff, evapotranspiration, and recharge. The relationship between these factors can be described as follows:

$$N_P - N_R - N_{ET} = Recharge$$

Where:

$N_P$ = *Precipitation*

$N_R$= *Runoff*

$N_{ET}$= *Evapotranspiration*

In the pre-development condition, the site receives 48 inches of precipitation Garling and Molenaar, 1965). Evapotranspiration in Pierce County is generally estimated at 22 inches per year (Savoca, 2010). Based on the surface geology, recharge is estimated at 15 inches per year (Welch, 2014; Savoca, 2010), so the remaining 11 inches must be considered runoff.

The post-development condition is somewhat more complicated, as the consumptive use calculated earlier must be accounted for and the changes in the nature of the site must be evaluated. Precipitation remains unchanged. Approximately 86% of the area of the site will also remain untouched. The remaining 14% of the site will be cleared, graded, and changed as discussed earlier. A home and driveway will be added, though compliance with County stormwater requirements means that the water falling directly on these impermeable surfaces will be re-routed and infiltrated into the subsurface. These impervious surfaces will cover about 2% of the site.

The nature of the groundcover will change from mature trees to a grass lawn in the area where the yard, drainfield, and reserve drainfield will be located. This will result in a commensurate decrease in evapotranspirative demand discussed earlier. However, in order to keep our analysis conservative, we elected to use three quarters of the earlier-stated decrease (15%). As stated earlier, for the impervious areas, the evapotranspiration rate will be reduced by approximately 90%. The amended soils in this area will have an enhanced infiltration capacity and will more readily accept rainfall, and County regulations require infiltration and dispersion of runoff, significantly reducing runoff from this portion of the property. As a conservative value, we reduced runoff by a half, to a value of 5.5 inches per year.

Septic return flow will offset some of the water use on the property. Typically, 90% of the indoor use is considered to be returned to the drainfield (Culhand and Nazy, 2015). However, we

applied an evapotranspirative loss factor (ranging from 10% in May up to 30% in July and August) to the septic effluent return flow, as laterals may be within reach of plant and turf roots, resulting in the uptake of some of the effluent during hotter months. Finally, the water used outdoors is considered to be a largely consumptive use, with only 20% infiltrated into the subsurface (Culhane and Nazy, 2015).

With these factors, we are able to calculate a post-development water budget via the following relationship:

$$N_P - N_R - N_{ET} - N_{WW} + N_{OR} + N_{SR} = Recharge$$

Where:

$N_P$ = *Precipitation*

$N_R$= *Runoff*

$N_{ET}$= *Evapotranspiration*

$N_{WW}$= *Well Withdrawal*

$N_{OR}$= *Outdoor Use Return Flow*

$N_{SR}$= *Septic Return Flow*

The results of this calculation are presented in Table 3.

Table 3: Pre- and post-development annual water balance

| Pre-development | | |
|---|---|---|
| | in/yr | gal/day |
| Precipitation | 48 | 2459 |
| Runoff | -11 | -564 |
| Evapotranspiration | -22 | -1127 |
| Well Withdrawal | 0 | 0 |
| Septic Return | 0 | 0 |
| Outdoor Return | 0 | 0 |
| Recharge | 15 | 768 |

| Post-development | | |
|---|---|---|
| | in/yr | gal/day |
| Precipitation | 48 | 2459 |
| Runoff (-50%) | -5.5 | -282 |
| Evapotranspiration (-74.2%)[1] | -16.3 | -836 |
| Well Withdrawal | -4.7 | -243 |
| Outdoor Return (20%) | 0.3 | 14 |
| Septic Return (63% to 90%)[2] | 2.8 | 142 |
| Recharge | 24.5 | 1254 |
| Total Change | | 485 |

[1] Reduction prorated for combination of pervious and impervious surfaces

[2] 90% return flow in wet season ranging downward to 63% in dry season due to ET uptake above drain field

In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, will result in an increase to the amount of water recharging the subsurface. The resulting water balance of this project entirely offsets the consumptive use from the proposed well on the property and provides an increase in recharge as a result of the post-development condition.

*Seasonal Consideration*

The annual water balance indicates an increase in average recharge at the property of 485 gallons per day due to the development. However, this increase in recharge will not occur evenly over the year. The increase in recharge due to the reduction in runoff will occur mainly in the wet season. The reduction in evapotranspiration will occur mostly in the dry season. Water use, and consequently well production, will be higher in the dry season. Return from outdoor water use will occur mainly in the dry season. And return from indoor use will occur year-round, but will be higher in the wet season due to possible uptake by plants above the drain field.

If we consider the dry season to occur from May and October, assign the changes in water balance between wet and dry seasons accordingly, and presume that all the changes in recharge occur during this season, we can develop an approximate change in recharge for the dry season as shown on Table 4.

Table 4: Dry season change in recharge

| | gal/day |
|---|---|
| Precipitation | 0 |
| Runoff reduction | 0 |
| Evapotranspiration reduction | 291 |
| Well Withdrawal [1] | -310 |
| Outdoor Return | 14 |
| Septic Return [2] | 126 |
| Total Change | 121 |

[1] Average well production from May through October
[2] Average septic return flow from May through October

The effects of both the well production and the recharge will be attenuated relative to aquifer discharges to surface water due to both vertical and horizontal distance and the fact that the aquifers have substantial storage. Timing of recharge entering the aquifer will be attenuated by the approximately 50 feet of sediments between the surface and the upper aquifer. However, as indicated by Table 4, the increase in recharge even during the dry season should be larger than the consumptive use.

In the case of the well, if it is placed in the Qva aquifer, it will be roughly 4,000 to 5,000 feet from the nearest downgradient aquifer discharge point in the Crescent Valley Creek. If it is placed in the lower portion of the QA1 aquifer, it will be 6,000 to 7,000 feet from the likely aquifer discharge points at Colvos Passage. Considering that the highest daily average production rate will be approximately 0.3 gpm, resulting in drawdown in the aquifer outside the wellbore of less than one foot, the change in gradient driving the change in aquifer discharge will be extremely small. Further, this change in gradient should be offset by the increase in recharge. In the case of a well in the Qva aquifer, the production and increase in recharge occur in the same aquifer, negating effects to the nearby creek and lake, which receives discharge from that aquifer. In the case of the well being completed in the QA1 aquifer, the increase in recharge to the shallow aquifer will increase flows to Crescent Creek, while the pumping impact from the well will mostly occur as a smaller discharge directly to Puget Sound. Pumping from the QA1 aquifer may slightly increase leakage downward out the Qva, causing an extremely small decrease in discharge to Crescent Lake and Creek from the Qva, but this will be greatly offset by the increase in recharge to the Qva.

Because of attenuation effects, the system should act largely in a steady-state manner. And certainly, any transient analysis on a time period shorter than wet and dry seasons is not warranted.

## Recommendations

Consider drilling the proposed well to at least 100 feet deep in order to complete the well in the deeper portion of the Qva aquifer. The shallower wells have a higher susceptibility to impacts due to surficial contamination and are more likely to experience seasonal deficiencies. Additionally, the wells completed in the deeper portion of the Qva and the Qa1 aquifer have twice the available drawdown, so they should prove to be a more reliable water source over the long term.

## Conclusion

Based on our analysis of the information provided, the well proposed to supply this project will not impact or impair a senior water rights holder, and will not impact or impair established in-stream flows and closures as identified by the State. As the net annual water balance in the post-development condition is positive and results in additional infiltration, no mitigation is required.

*The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted environmental and hydrogeologic practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Pat and Juli Sullivan. Unless specifically stated in the document, no warranty, expressed or implied, is made.*

## References


Bear, J, 1979, Hydraulics of groundwater: New York, McGraw-Hill

Booth, D.B. and Troost, K.G., 2005, Geologic map of the Olalla Quadrangle, King, Kitsap, and Pierce Counties, Washington: United States Geological Survey, Scientific Investigations Map 2902, scale 1:24,000

Brown, S. and Cotton, M. 2011, Changes in soil properties and carbon sequestration potential as a result of compost or mulch application: results of on-farm sampling: http://faculty.washington.edu/slb/docs/SBrown_compost_farmsoils_final.pdf

Culhane, T. and Nazy, D., 2015, Permit exempt water use in Washington State: Water Resources Program, Washington State Department of Ecology

Ferris, J.G., et at, 1962, Theory of aquifer tests: U.S. Geological Survey Water-Supply Paper 1536-E

Garling, M.E. and Molenaar, D. 19675, Water resources and geology of the Kitsap Peninsula and certain adjacent islands: U.S. Geological Survey, Water Supply Bulletin No. 18

Golder Associates, 2013, Skagit County Exempt Well Metering Program – 2012-2013, March 27, 2014: https://www.skagitcounty.net/PublicWorksNaturalResourcesManagement/Documents/Skagit%20County%20Exempt%20Well%20Metering%20Program%20--%202012-2013.pdf

Kays, B.L, et al, 2015, Amending soils for enhanced infiltration of stormwater: International Low Impact Development Conference 2015, LID: It Works in All Climates and Soils, edited by Michael Barrett, p. 123-132

Sanford, W. E. and Selnick, D. L., 2013, Estimation of evapotranspiration across the conterminous United States using a regression with climate and land-cover data: Journal of the American Water Resources Association (JAWRA), vol.49, issue 1, p. 217–230

Savoca, M.E., et al, 2010, Hydrogeologic framework, groundwater movement, and water budget in the Chambers–Clover Creek watershed and vicinity, Pierce County, Washington: United States Geological Survey Scientific Investigations Report 2010-5055

Theis, CV, 1935, The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage: American Geophysical Union Transactions, vol. 16, p. 519-524

US Census Bureau QuickFacts: http://www.census.gov/quickfacts/table/PST045216/53053,00

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Washington Agricultural Experiment Station, Soil survey of Pierce County area, Washington: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

United States Geologic Survey, 2013, 7.5-Minute topographic quadrangle, Olalla, Washington, scale 1:24,000

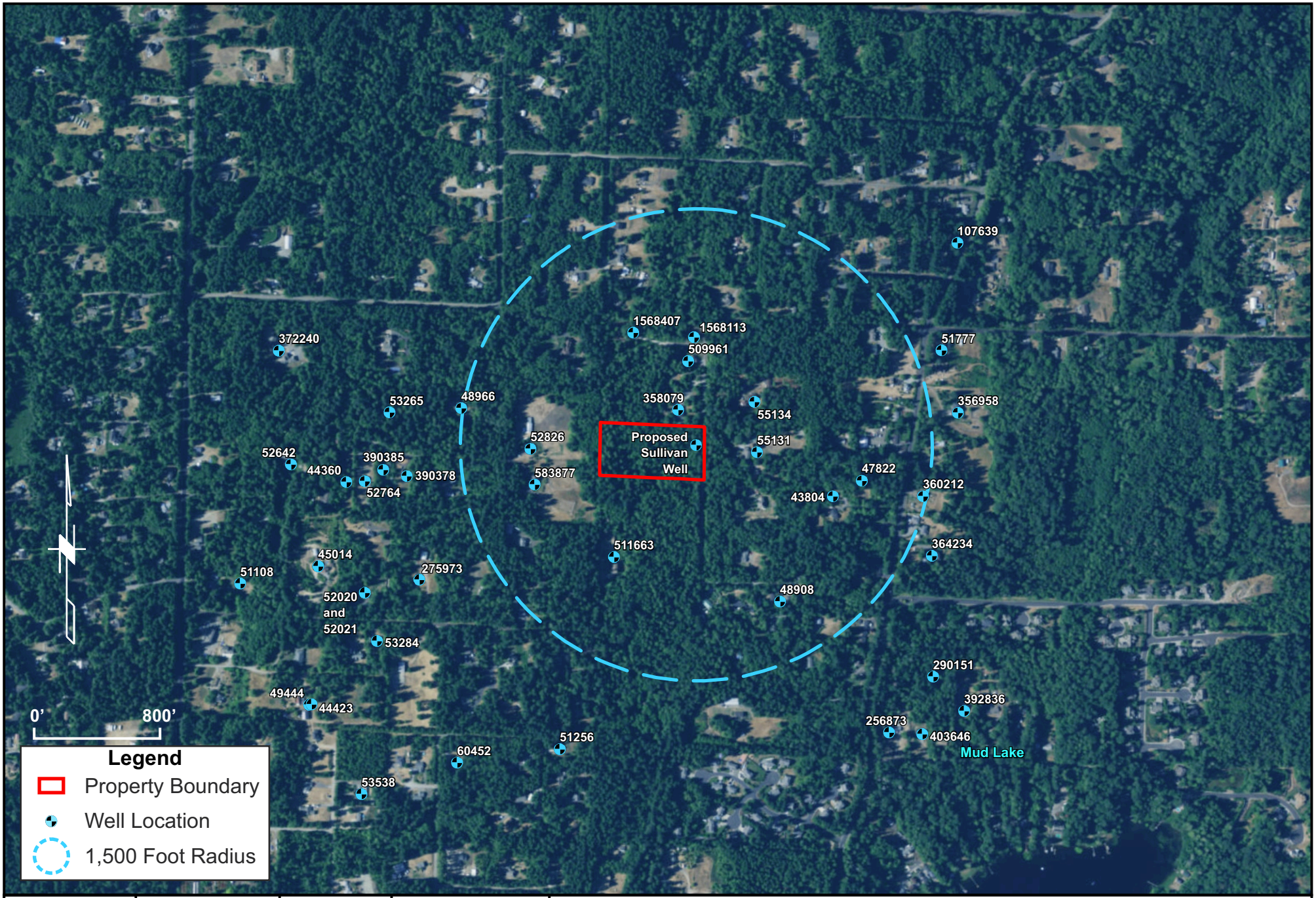
Welch, W.B., et al, 2014, Hydrogeologic framework, groundwater movement, and water budget of the Kitsap Peninsula, west-central Washington: United States Geological Survey Scientific Investigations Report 2014-5106

Zhang, L., K. Hickel, W. R. Dawes, F. H. S. Chiew, A. W. Western, and P. R. Briggs, 2004, A rational function approach for estimating mean annual evapotranspiration: Water Resources Research, vol. 40, W02502, doi:10.1029/2003WR002710

## Attachments

Appendix A  Figure 1 – Well Location and Vicinity Map
Appendix B Well Logs
Appendix C Soil Logs

# APPENDIX A -- FIGURES




| | | | | |
|---|---|---|---|---|
| ROBINSON NOBLE | Note: Image from ESRI ArcGIS | PM: MFP<br>February 2017<br>3175-001A | Pierce County<br>T 22 N/R 02 E - 17<br>Scale 1” = 800’ | Figure 1<br>Well Location and Vicinity Map<br>Pat & Juli Sullivan: Hydrogeologic Assessment |

# APPENDIX B

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

**STATE OF WASHINGTON**

Application No. Airport

Permit No. .....

**(1) OWNER:** Name A. L. Hart (Tallman) Address 15616 Crescent Valley Dr. N.W. Gig Harbor, Wn.

**(2) LOCATION OF WELL:** County Pierce — NE ¼ NE ¼ Sec. 17 T. 22 N., R. 2E W.M.

Bearing and distance from section or subdivision corner A

**(3) PROPOSED USE:** Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

**(4) TYPE OF WORK:** Owner's number of well (if more than one) ....
New well [X] Method: Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [ ] Jetted [ ]

**(5) DIMENSIONS:** Diameter of well 6 inches.
Drilled 90 ft. Depth of completed well 90 ft.

**(6) CONSTRUCTION DETAILS:**

**Casing installed:** 6 " Diam. from 0 ft. to 85½ ft.
Threaded [ ] " Diam. from ft. to ft.
Welded [X] " Diam. from ft. to ft.

**Perforations:** Yes [ ] No [X]
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

**Screens:** Yes [X] No [ ]
Manufacturer's Name Johnson
Type stainless steel Model No.
Diam. 6 Slot size 35 from 85 ft. to 90 ft.
Diam. Slot size from ft. to ft.

**Gravel packed:** Yes [ ] No [X] Size of gravel:
Gravel placed from ft. to ft.

**Surface seal:** Yes [ ] No [X] To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? Depth of strata
Method of sealing strata off

**(7) PUMP:** Manufacturer's Name
Type: H.P.

**(8) WATER LEVELS:** Land-surface elevation above mean sea level .... ~340 ft.
Static level 45 ft. below top of well Date 10-16-62
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

**(9) WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test 10-16-62
Bailer test 40 gal./min. with 25 ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]

**(10) WELL LOG:**

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

| MATERIAL | FROM | TO |
|---|---|---|
| Topsoil | 0 | 2 |
| Sand & gravel brown hardpan | 2 | 37 |
| Blue sand & gravel hardpan | 37 | 53 |
| Sand & gravel some water | 53 | 63 |
| Gray hardpan some seepage | 63 | 84 |
| Sand & gravel water bearing | 84 | 90 |

RECEIVED
JUN 12 1975
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

22/2E-17A

Work started 10-13- 19 62 Completed 10-16- 19 62

**WELL DRILLER'S STATEMENT:**

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Harbor Pump & Drilling Co., Inc.
(Person, firm, or corporation) (Type or print)

Address 7825 46th Ave. N.W. Gig Harbor, Wa 9833

[Signed] Byrd Gustin By: M. Butler
(Well Driller)

License No. 0476 223 01 8455 Date 6-11- 19 74

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT
**STATE OF WASHINGTON**

Application No
Permit No

**(1) OWNER:** Name Harvey Brown Address 15712 Crescent Valley Dr. NW Gig Hrb

**(2) LOCATION OF WELL:** County Pierce — NE ¼ NE ¼ Sec. 17 T. 22 N., R. 2E W.M.

Bearing and distance from section or subdivision corner

**(3) PROPOSED USE:** Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

**(4) TYPE OF WORK:** Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

**(5) DIMENSIONS:** Diameter of well 6 inches.
Drilled 86 ft. Depth of completed well 86' ft.

**(6) CONSTRUCTION DETAILS:**
**Casing installed:** 6 " Diam. from 0 ft. to 82 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

**Perforations:** Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

**Screens:** Yes ☒ No ☐ Johnson
Manufacturer's Name
Type stainless steel Model No. 86
Diam. 6 Slot size 60 from 82 ft. to 86 ft.
Diam. Slot size from ft. to ft.

**Gravel packed:** Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

**Surface seal:** Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite 100 lbs.
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

**(7) PUMP:** Manufacturer's Name Berkeley
Type: Submersible H.P.

**(8) WATER LEVELS:** Land-surface elevation above mean sea level ft.
Static level 46 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

**(9) WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test
Bailer test 10 gal./min. with 20 ft. drawdown after 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

**(10) WELL LOG:**
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

| MATERIAL | FROM | TO |
|---|---|---|
| Brown top soil | 0 | 3 |
| Gray Hard pan | 3 | 26 |
| Sandy brown hard pan | 26 | 31 |
| Brown sand, some seepage | 31 | 38 |
| Brown sandy clay | 38 | 43 |
| Gray sandy hard pan | 43 | 60 |
| Gray Hard pan | 60 | 68 |
| Gray hard pan with clay | 68 | 74 |
| Gray sand and gravel, - water bearing | 74 | 77 |
| Hard packed sand & gravel | 77 | 82 |
| Gray sand & gravel, water | 82 | 86 |
| Gard packed sand & gravel | 86 | - |

RECEIVED
MAY 22 1980
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 4-24 19 80 Completed 4-28 19 80

**WELL DRILLER'S STATEMENT:**

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME HARBOR PUMP & DRILLING CO., INC. (Person, firm, or corporation) (Type or print)

Address 11302 Burnham Dr. NW Gig Harbor, W

[Signed] Wade Hudson By: P. Miller (Well Driller)

License No. 223-01-8455 Date April 29, 19 80
597

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

# WATER WELL REPORT

## STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name John Berry [redacted]

(2) LOCATION OF WELL: County Pierce SW ¼ NE ¼ Sec. 17 T. 22 N., R. 2E W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) [redacted]

(3) PROPOSED USE: ☒ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well Six inches. Drilled 151 feet. Depth of completed well 151 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from +1 ft. to 146 ft.
Welded ☒ Liner installed ☐ Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.
_____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Cook
Type Stainless Model No. _____
Diam. 6 Slot size 12 from 146 ft. to 151 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name Gould's
Type: Submersible H.P. 3/4

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 90 ft. below top of well Date 2-21-91
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? PP
Yield: 14 gal./min. with 7 ft. drawdown after 2 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 0 | 97 | | | | |
| 2 | 90 | | | | |

Date of test _____
Bailer test 20 gal./min. with 10 ft. drawdown after 1 hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Top Soil | 0 | 2 |
| Sand Brown | 2 | 13 |
| Hard pan | 13 | 33 |
| Sand + Gravel (water-bearing) | 33 | 35 |
| Clay (Blue) | 35 | 122 |
| Hard pan | 122 | 128 |
| Sand + Gravel (water) | 128 | 151 |

Work started Aug - 30 19 90 Completed Sept 6 19 90

**WELL CONSTRUCTOR CERTIFICATION:**

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME PP Well Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Port Orchard

(Signed) P.P. Wolley (WELL DRILLER) License No. 0521

Contractor's Registration No. PP W.W. 111PC Date Sept 10 19 90

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329

# WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. 065839
Water Right Permit No.

(1) OWNER: Name STACY BRIAN Address 1211 SUNSET DR S TACOMA, WA 98465-

(2) LOCATION OF WELL: County PIERCE - NE 1/4 NW 1/4 Sec 17 T 22 N., R 2E WM
(2a) STREET ADDRESS OF WELL (or nearest address) 3103 196TH ST NW

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: AIR ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 53 ft. Depth of completed well 47 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from 0 ft. to 47 ft.
WELDED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: NO
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: NO
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 18 ft.
Material used in seal BENTONITE CLAY
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 20 ft. below top of well Date 12/06/90
Artesian Pressure lbs. per square inch Date / /
Artesian water controlled by

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test 30 gal/min. 25 ft. drawdown after 1 hrs.
Air test gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

| MATERIAL | FROM | TO |
|---|---|---|
| SANDY TOPSOIL | 0 | 2 |
| SAND AND SOME GRAVEL | 2 | 9 |
| COMPACTED SAND | 9 | 14 |
| COMPACTED SAND AND CLAY | 14 | 24 |
| SEEPAGE SAND CLAY | 24 | 26 |
| HARDPAN | 26 | 42 |
| WATER SAND & GRAVEL | 42 | 47 |
| DIRTY SAND | 47 | 53 |

Work started 11/30/90 Completed 12/03/90

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME RICHARDSON WELL DRILLING
(Person, firm, or corporation) (Type or print)

ADDRESS PO BOX 44427 TAC WA 98444

[SIGNED] License No. 0284

Contractor's Registration No. RICHAN*321OB Date 01/22/91

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W052689
UNIQUE WELL I.D. # ABP815
Water Right Permit No.

(1) OWNER: Name PEDRO AND WENDY PINTO Address 22404 Military Road S., Sea-Tac, WA 98198

(2) LOCATION OF WELL: County Pierce NW 1/4 NE 1/4 Sec 17 T 22 N, R 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) off Crescent Valley Road

(3) PROPOSED USE: [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK: Owner's number of well (If more than one)
Abandoned [ ] New well [X] Method: Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 178 feet. Depth of completed well 178 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 178 ft.
Welded [X]
Liner installed [ ] " Diam. from ft. to ft.
Threaded [ ] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes [ ] No [X]
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [XX] Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Goulds
Type: submersible 10GS10 H.P. 1

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 107 ft. below top of well Date 5/02/95
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [X] No [ ] If yes, by whom? Gresham
Yield: 15 gal./min. with 18 ft. drawdown after 2 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| Full recov. in 5 min. | | | | | |

Date of test 5/02/95
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 20+ gal./min. with stem set at 170 ft. for 1 hrs.
Artesian flow g.p.m. Date
Temperature of water 50 Was a chemical analysis made? Yes [X] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Brown topsoil | 0 | 4 |
| Gray hardpan | 4 | 27 |
| Gray silty sand & gravel | 27 | 69 |
| Gray hardpan | 69 | 93 |
| Gray silty sand & gravel | 93 | 131 |
| Gray hardpan | 131 | 164 |
| Gray clay w/gravel | 164 | 167 |
| Gray silty coarse sand & gravel, H20 | 167 | 178 |

RECEIVED
95 MAY 15 AM 10:08
WASH. STATE DEPT. OF ECOLOGY

Work Started 4/26/95 19. Completed 4/27/95 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Gresham Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 3105 NW Lakeness Rd.,Poulsbo, WA 98370
(Signed) (WELL DRILLER) License No. 0761
Contractor's Registration No. GRESHWD055BC Date 5/04/95 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W053930

UNIQUE WELL I.D. # ABP828

Water Right Permit No. _____

(1) **OWNER:** Name MARK KNOWLES Address 21600 24TH AVE.S.#E101, DES MOINES,WA 98198

(2) **LOCATION OF WELL:** County PIERCE NW 1/4 NE 1/4 Sec 17 T. 22 N. R. 2E W.M.

(2a) **STREET ADDRESS OF WELL** (or nearest address) 15821 28TH AVENUE NW, GIG HARBOR

(3) **PROPOSED USE:** [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) **TYPE OF WORK:** Owner's number of well (If more than one) _____

Abandoned [ ] New well [X] Method: Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [XX] Jetted [ ]

(5) **DIMENSIONS:** Diameter of well 6 inches. Drilled 119 feet. Depth of completed well 119 ft.

(6) **CONSTRUCTION DETAILS:**

Casing Installed: 6 " Diam. from 0 ft. to 119 ft.
Welded [X]
Liner installed [ ] _____ " Diam. from _____ ft. to _____ ft.
Threaded [ ] _____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes [ ] No [X]
Type of perforator used _____
SIZE of perforations _____ in. by _____ In.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes [ ] No [XX]
Manufacturer's Name _____
Type _____ Model No. _____
Diam. ____ Slot size _____ from _____ ft. to _____ ft.
Diam. ____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) **PUMP:** Manufacturer's Name GOULDS
Type: SUBMERSIBLE 10GS10 H.P. 1

(8) **WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.
Static level 72 ft. below top of well Date 6/09/95
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [XX] No [ ] If yes, by whom? GRESHAM
Yield: 15 gal./min. with 5 ft. drawdown after 1 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| FULL RECOV. | IN 2 MIN. | | | | |

Date of test 6/09/95
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest 20 gal./min. with stem set at 115 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 50 Was a chemical analysis made? Yes [XX] No [ ]

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| OVERBURDEN | 0 | 4 |
| GRAY HARDPAN | 4 | 28 |
| GRAY SAND & GRAVEL | 28 | 52 |
| BLUE CLAY | 52 | 78 |
| GRAVEL, H2O - 2GPM | 78 | 79 |
| GRAY HARDPAN | 79 | 112 |
| GRAVEL, H2O | 112 | 119 |

Work Started 6/07/95 19. Completed 6/07/95 19

**WELL CONSTRUCTOR CERTIFICATION:**

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME GRESHAM WELL DRILLING, INC. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 3105 NW LAKENESS RD.,POULSBO,WA 98370

(Signed) _____ (WELL DRILLER) License No. 0761

Contractor's Registration No. GRESHWD055BC Date 6/16/95 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

# WATER WELL REPORT

ECOLOGY Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

**Construction/Decommission** *("x" in circle)*

● Construction

○ Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* 127549

**CURRENT Notice of Intent No.** WO61595

Unique Ecology Well ID Tag No. ABA-064

Water Right Permit No. _____

Property Owner Name JOE LAW

Well Street Address 18826 28th AVE N.W.

City GIG HARBOR County: PIERCE

Location NE 1/4- 1/4 NW 1/4 Sec 17 Twn 22 R 2 (EWM) circle one or WWM

Lat/Long: (s,t,r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0222171054

**PROPOSED USE:** ■ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

■ New Well ☐ Reconditioned *Method* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ■ Cable ☐ Rotary ☐ Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 102 ft

Depth of completed well 103 ft

**CONSTRUCTION DETAILS**

**Casing Installed:** ■ Welded 6" Diam from 0 ft. to 103 ft

☐ Liner installed _____" Diam from _____ ft. to _____ ft

☐ Threaded _____" Diam. from _____ ft. to _____ ft.

**Perforations:** ☐ Yes ■ No

Type of perforator used _____

SIZE of perfs _____ in by _____ in and no of perfs _____ from _____ ft to _____ ft

**Screens:** ■ Yes ☐ No ■ K-Pac Location 96

Manufacturer's Name Johnson

Type Stainless Steel Model No _____

Diam 5" Slot Size 10 from 102 ft to 96 ft

Diam _____ Slot Size _____ from _____ ft to _____ ft

**Gravel/Filter packed:** ☐ Yes ■ No ☐ Size of gravel/sand _____

Materials placed from _____ ft to _____ ft.

**Surface Seal:** ■ Yes ☐ No To what depth? 19 ft

Materials used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ■ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name _____

Type _____ H P _____

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.

Static level 65 ft below top of well Date _____

Artesian pressure _____ lbs per square inch Date _____

Artesian water is controlled by _____ (cap,valve, etc )

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? ■ Yes ☐ No If yes, by whom? _____

Yield 10 gal./min with 25' ft drawdown after 2 hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

*Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| Pump Shut Off | 77' | | | | |
| 1 min | 67' | | | | |

Date of test _____

Bailer test 12 gal./min with _____ ft drawdown after 2 hrs

Airtest _____ gal./min with stem set at _____ ft for _____ hrs

Artesian flow _____ g p m Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Top soil | 0 | 4 |
| clay-gravel | 4 | 11 |
| clay-gravel-boulders | 11 | 16 |
| brown sand | 16 | 47 |
| gravel-sand-clay | 47 | 83 |
| gray clay-sand | 83 | 85 |
| gravel-sand-clay | 85 | 96 |
| sand gray w/b. | 96 | 102 |

RECEIVED
JAN 16 2003
Washington State Department of Ecology

Start Date 12/4/02 Completed Date 12/23/02

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

■ Driller ☐ Engineer ☐ Trainee Name (Print) Bruce Lewis

Driller/Engineer/Trainee Signature Bruce Lewis

Driller or Trainee License No. 2627

**If trainee, licensed driller's Signature and License no.** _____

Drilling Company HARBOR PUMP CO. INC

Address P.O. Box 330

City, State, Zip BURLEY WA. 98322

Contractor's Registration No. HARBOPC114DT Date 1/13/03

Ecology is an Equal Opportunity Employer ECY 050-1-20 (Rev 4/01)

# WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

**Construction/Decommission** *("x" in circle)*

(X) Construction

( ) Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* 130700

**CURRENT Notice of Intent No.** W162612

Unique Ecology Well ID Tag No. AGE 533

Water Right Permit No. _____

Property Owner Name ANN Lemieux

Well Street Address 15625 Crescent Vy Dr NW

City Big Harbor County: Pierce

Location NE 1/4- 1/4 NE 1/4 Sec 17 Twn 22 R 2 (EWM) or WWM *circle one*

Lat/Long: (s,t,r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0222171065

**PROPOSED USE:** (X) Domestic ( ) Industrial ( ) Municipal ( ) DeWater ( ) Irrigation ( ) Test Well ( ) Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

(X) New Well ( ) Reconditioned *Method:* ( ) Dug ( ) Bored ( ) Driven ( ) Deepened (X) Cable ( ) Rotary ( ) Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 218 ft. Depth of completed well 218 ft.

**CONSTRUCTION DETAILS**

Casing Installed: (X) Welded 6" Diam from +1 ft to 213 ft

( ) Liner installed _____" Diam from _____ ft to _____ ft

( ) Threaded _____" Diam from _____ ft to _____ ft.

**Perforations:** ( ) Yes (X) No

Type of perforator used _____

SIZE of perfs _____ in by _____ in. and no of perfs _____ from _____ ft to _____ ft

**Screens:** (X) Yes ( ) No ( ) K-Pac Location _____

Manufacturer's Name _____

Type S/S Model No _____

Diam 6T Slot Size .010 from 213 ft to 218 ft

Diam _____ Slot Size _____ from _____ ft to _____ ft

**Gravel/Filter packed:** ( ) Yes (X) No ( ) Size of gravel/sand _____

Materials placed from _____ ft to _____ ft.

**Surface Seal:** (X) Yes ( ) No To what depth? 18 ft

Materials used in seal Holeplug

Did any strata contain unusable water? ( ) Yes (X) No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name Gould

Type Submersible HP 3/4

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft

Static level 92.5 ft below top of well Date 3/5/03

Artesian pressure _____ lbs per square inch Date _____

Artesian water is controlled by _____ (cap,valve, etc)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? (X) Yes ( ) No If yes, by whom? by Driller

Yield 16 gal./min with 45 ft. drawdown after 1 hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

*Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 8:00 | 137 | 2010 | 92.5 | | |
| 5:00 | 110 | | | | |
| 10:12 | 96 | | | | |

Date of test _____

Bailer test _____ gal./min with _____ ft. drawdown after _____ hrs

Airtest _____ gal./min with stem set at _____ ft for _____ hrs

Artesian flow _____ g p m Date _____

Temperature of water _____ Was a chemical analysis made? ( ) Yes ( ) No

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

| MATERIAL | FROM | TO |
|---|---|---|
| Top soil | 0 | 1 |
| Sand & gravel | 1 | 5 |
| gravely Hardpan | 5 | 60 |
| Hardpan | 60 | 88 |
| Sand | 88 | 91 |
| Clayish Hardpan & gravel | 91 | 194 |
| Fine Sand | 194 | 210 |
| Sand | 210 | 218 |

RECEIVED APR 04 2003 DEPARTMENT OF ECOLOGY WELL DRILLING UNIT DEPT OF ECOLOGY FISCAL BUDGET APR 1 P1:04

Start Date 2/17/03 Completed Date 3/4/03

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

(X) Driller ( ) Engineer ( ) Trainee Name (Print) Wesley Glessner

Driller/Engineer/Trainee Signature Wesley Glessner

Driller or Trainee License No. 0154

Drilling Company Wes Glessner Drilling

Address PO Box 487

City, State, Zip Burley Wa 98322

Contractor's Registration No. WESGLD*026P6 Date 3/5/03

**If trainee, licensed driller's Signature and License no.** _____

Ecology is an Equal Opportunity Employer ECY 050-1-20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

**Construction/Decommission** *("x" in circle)*

☒ Construction 282131

☐ Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* _____

**PROPOSED USE:** ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 148 ft. Depth of completed well 148 ft.

**CONSTRUCTION DETAILS**

**Casing Installed:** ☒ Welded 6" Diam. from 0 ft. to 233 ft.

☐ Liner installed _____" Diam. from _____ ft. to _____ ft.

☐ Threaded _____" Diam From _____ ft. to _____ ft.

**Perforations:** ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

**Screens:** ☒ Yes ☐ No ☒ K-Pac Location 141' 10-3/4"

Manufacturer's Name JNSN

Type SS Model No. TELES

Diam. 5" Slot size 18 from 143 ft. to 148 ft.

Diam _____ Slot size _____ from _____ ft. to _____ ft.

**Gravel/Filter packed:** ☐ Yes ☒ No Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

**Surface Seal:** ☒ Yes ☐ No To what depth? 18 ft

Material used in seal BENTONITE

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name _____

Type: _____ H.P. _____

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.

Static level 83 ft below top of well Date 11/13/2007

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? _____

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test _____

Bailer test 15 gal./min. with 24 ft drawdown after 1 hrs.

Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

## CURRENT

**Notice of Intent No.** WEO7604

Unique Ecology Well ID Tag No. BAT439

Water Right Permit No. _____

Property Owner Name WILLIAM SARNO

Well Street Address 15905 28TH AVE NW

City GIG HARBOR County PIERCE

Location NW1/4-1/4 NE1/4 Sec 17 Twn 22 R 2E **(s, t, r Still REQUIRED)** EWM ☒ Or WWM ☐

**Lat/Long** Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. (Required) 0222175005

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| PIPE STICK UP | 0 | 1 |
| BROWN SAND, CLAY, GRAVEL | 1 | 16 |
| GRAY SAND, GRAVEL, WET | 16 | 21 |
| BROWN SAND, GOME GRAVEL, WET | 21 | 41 |
| GRAY SAND, CLAY, GRAVEL, | 41 | |
| SEAMS WET | | 61 |
| GRAY SILT, SAND, GRAVEL | 61 | 85 |
| GRAY SAND, GRAVEL, SEAMS WATR | 85 | 109 |
| GRAY SILT, SAND, GRAVEL, CLAY | 109 | 140 |
| GRAY SAND, GRAVEL, SEAMS WATR | 140 | 148 |

RECEIVED
DEC 10 2007
Washington State
Department of Ecology

Start Date 11/7/2007 Completed Date 11/13/2007

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JOHN SULLIVAN

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 2218

IF TRAINEE: Driller's License No:

Driller's Signature:

Drilling Company NICHOLSON DRILLING INC

Address PO BOX 123

City, State, Zip PORT ORCHARD , WA, 98366

Contractor's Registration No. NICHOD11370M Date 11/30/2007

22-2E-20f

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

**Construction/Decommission** *("x" in circle)*

(X) Construction

( ) Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 295208

**CURRENT**
**Notice of Intent No.** W216866

Unique Ecology Well ID Tag No. APR640

Water Right Permit No. _____

Property Owner Name Swen Weinmann

Well Street Address 15515 30th AVE NW

City Gig Harbor County Pierce

Location SE 1/4-1/4 NW 1/4 Sec 20 Twn 22N R 2E EWM or WWM (circle one)

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0222171051

**PROPOSED USE:** [X] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

[X] New well [ ] Reconditioned *Method:* [ ] Dug [ ] Bored [ ] Driven [ ] Deepened [X] Cable [ ] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 160 ft.
Depth of completed well 160 ft.

**CONSTRUCTION DETAILS**

Casing Installed: [X] Welded 6" Diam. from +1 ft. to 155 ft.
[ ] Liner installed _____" Diam. from _____ ft. to _____ ft.
[ ] Threaded _____" Diam. from _____ ft. to _____ ft.

**Perforations:** [ ] Yes [X] No
Type of perforator used _____
SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

**Screens:** [X] Yes [ ] No [X] K-Pac Location 154
Manufacturer's Name Johnson
Type Stainless steel Model No. _____
Diam. 5 Slot size 14 from 155 ft. to 160 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

**Gravel/Filter packed:** [ ] Yes [X] No [ ] Size of gravel/sand _____
Materials placed from _____ ft. to _____ ft.

**Surface Seal:** [X] Yes [ ] No To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

**PUMP:** Manufacturer's Name Goulds
Type: Submersible H.P. 1

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.
Static level 108 ft. below top of well Date 10/25/07
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom? Olsen Drl.
Yield: 15 gal./min. with 9 ft. drawdown after 1 hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 0 | 117' | 3 m | 108' | | |
| 1 m | 111' | | | | |
| 2 m | 104' | | | | |

Date of test 10/25/07
Bailer test 10 gal./min. with 8 ft. drawdown after 2 hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? [X] Yes [ ] No

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Brown sand | 0 | 37 |
| Grey till | 37 | 132 |
| Grey clay | 132 | 136 |
| Grey sand | 136 | 145 |
| Grey sand w/b | 145 | 160 |
| Grey tight sand | 160 | ---- |

RECEIVED
NOV 14 2007
DEPT. OF ECOLOGY

Start Date 9/20/07 Completed Date 10/25/07

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) Matt Olsen
Driller/Engineer/Trainee Signature Matt Olsen
Driller or trainee License No. 2337

Drilling Company Olsen Drilling
Address PO Box 1554
City, State, Zip Port Orchard, WA 98366
Contractor's Registration No. OLSEND101LJ Date 11/9/07

If TRAINEE,
Driller's Licensed No. _____
Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

339850

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W 34136
UNIQUE WELL I.D. # ABG 626
Water Right Permit No.

(1) OWNER: Name Hallstrom, Ubert Address 4911 No. Highland, Tacoma WA

(2) LOCATION OF WELL: County Pierce NW 1/4 NW 1/4 Sec. 17 T. 22N N., R. 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 3025 156th St. N.W., City Harbor, WA.

(3) PROPOSED USE: ☒ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 53 feet. Depth of completed well 53 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 6" Diam. from +2 ft. to 53 ft.
Welded ☒ Liner installed ☐ Threaded ☐
_____ Diam. from _____ ft. to _____ ft.
_____ Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 19.5 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 22 ft. below top of well Date Nov. 3, 1994
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 9-10 gal./min. with stem set at 53' ft. for 1.0 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Top Soil | 0 | 2 |
| Brn Sands some Traces of Brn Silts | 2 | 11 |
| Brn Silts & Medium Sands & Small Amounts of Gravels | 11 | 31 |
| Silty, Gray Sands with Gravels & Sands & water Bearing | 31 | 36 |
| | 36 | 53 |

RECEIVED
DEC 12 AM 9:47
WATER RIGHTS

Work Started Nov 2 19 Completed Nov 3 19 94

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Holt Testing Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 1061 Todd Rd., Puyallup
(Signed) [signature] (WELL DRILLER) License No. 2198
Contractor's Registration No. HOLTT10870J Date Nov 3 19 94

(USE ADDITIONAL SHEETS IF NECESSARY)

ECL 050 1-20 (2/93)


The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

**Construction/Decommission** *("x" in circle)*

- [x] Construction
- [ ] Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* **WE21844**

**PROPOSED USE:** [x] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other

**TYPE OF WORK:** Owner's number of well (if more than one) ____

[x] New well [ ] Reconditioned *Method:* [ ] Dug [ ] Bored [ ] Driven [ ] Deepened [ ] Cable [x] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 98 ft.
Depth of completed well 98 ft.

***CONSTRUCTION DETAILS***

**Casing** [x] Welded 6" Diam. from 0 ft. to 96 ft.
**Installed:** [ ] Liner installed ____" Diam. from ____ ft. to ____ ft.
[ ] Threaded ____" Diam. From ____ ft. to ____ ft.

**Perforations:** [ ] Yes [x] No
Type of perforator used ____
SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

**Screens:** [x] Yes [ ] No [ ] K-Pac Location ____
Manufacturer's Name JOHNSON
Type STAINLESS STEEL Model No. TELESCOPE
Diam. 6 Slot size 16 from 93 ft. to 98 ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

**Gravel/Filter packed:** [ ] Yes [x] No Size of gravel/sand ____
Materials placed from ____ ft. to ____ ft.

**Surface Seal:** [x] Yes [ ] No To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? [ ] Yes [x] No
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

**PUMP:** Manufacturer's Name ____
Type: ____ H.P. ____

**WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.
Static level 40 ft. below top of well Date ____
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? [ ] Yes [x] No If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test ____
Bailer test 10 gal./min. with 9 ft. drawdown after 1 hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? [ ] Yes [x] No

## CURRENT

Notice of Intent No. WE21844
Unique Ecology Well ID Tag No. BHY 098
Water Right Permit No. ____
Property Owner Name David and Liz Stanton
Well Street Address 2811 159th ST CT NW
City Gig Harbor County Pierce
Location ne 1/4-1/4 ne 1/4 Sec 17 Twn 22 R 2E EWM [x] Or WWM [ ]
(s, t, r Still REQUIRED)

**Lat/Long**
Lat Deg ____ Lat Min/Sec ____
Long Deg ____ Long Min/Sec ____

Tax parcel No. (Required) 022175008

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Pipe stick up | 0 | 1 |
| Brown grey fill | 1 | 3 |
| Grey sand gravel clay wet | 3 | 16 |
| Grey sand gravel water | 16 | 34 |
| Grey sand gravel clay wet | 34 | 77 |
| Grey sand gravel water | 77 | 98 |

RECEIVED
MAY 27 2016
WA State Department of Ecology (SWRO)

Start Date 01/10/2016 Completed Date 01/20/2016

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[x] Driller [ ] Engineer [ ] Trainee Name Nic Sample
Driller/Engineer/Trainee Signature ____
Driller or trainee License No. 2770
IF TRAINEE: Driller's License No:
Driller's Signature:

Drilling Company Nicholson Drilling INC.
Address PO BOX 123
City, State, Zip Port Orchard, WA, 98367
Contractor's Registration No. NICHODI137OM Date 02/15/2016

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

**Construction/Decommission** *("x" in circle)*

- [x] Construction
- [ ] Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* **WE21843**

**PROPOSED USE:** [x] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other

**TYPE OF WORK:** Owner's number of well (if more than one) ____

[x] New well [ ] Reconditioned *Method:* [ ] Dug [ ] Bored [ ] Driven [ ] Deepened [ ] Cable [x] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 151 ft.
Depth of completed well 151 ft.

**CONSTRUCTION DETAILS**

**Casing Installed:** [x] Welded 6" Diam. from 0 ft. to 151 ft.
[ ] Liner installed ____" Diam. from ____ ft. to ____ ft.
[ ] Threaded ____" Diam. From ____ ft. to ____ ft.

**Perforations:** [ ] Yes [x] No
Type of perforator used ____
SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

**Screens:** [ ] Yes [x] No [ ] K-Pac Location ____
Manufacturer's Name ____
Type ____ Model No. ____
Diam. ____ Slot size ____ from ____ ft. to ____ ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

**Gravel/Filter packed:** [ ] Yes [x] No Size of gravel/sand ____
Materials placed from ____ ft. to ____ ft.

**Surface Seal:** [x] Yes [ ] No To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? [ ] Yes [x] No
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

**PUMP:** Manufacturer's Name ____
Type: ____ H.P. ____

**WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.
Static level 74 ft. below top of well Date ____
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? [ ] Yes [x] No If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test ____

Bailer test 17 gal./min. with 27 ft. drawdown after 1 hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? [ ] Yes [x] No

## CURRENT

Notice of Intent No. WE21843

Unique Ecology Well ID Tag No. BJN 278

Water Right Permit No. ____

Property Owner Name DAVID STANTON

Well Street Address 2917 159TH ST CT NW

City GIG HARBOR County PIERCE

Location nwl/4-1/4 ne 1/4 Sec 17 Twn 22 R 2E EWM [x] Or WWM [ ]
(s, t, r Still REQUIRED)

**Lat/Long**
Lat Deg ____ Lat Min/Sec ____
Long Deg ____ Long Min/Sec ____

Tax parcel No. (Required) 0222175007

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Pipe stick up | 0 | 1 |
| Grey sand gravel clay wet | 1 | 13 |
| Grey clay | 13 | 24 |
| Brown sand silt wet | 24 | 33 |
| Brey sand gravel cley damp | 33 | 109 |
| Grey clay | 109 | 136 |
| Grey sand gravel clay | 136 | 145 |
| Grey coarse sand gravel water | 145 | 151 |

RECEIVED
JUN 09 2016
WA State Department of Ecology (SWRO)

Start Date 02/02/16 Completed Date 02/04/16

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[x] Driller [ ] Engineer [ ] Trainee Name NIC SAMPLE
Driller/Engineer/Trainee Signature ____
Driller or trainee License No. 2770
IF TRAINEE: Driller's License No:
Driller's Signature:

Drilling Company NICHOLSON DRILLING INC.
Address PO BOX 123
City, State, Zip PORT ORCHARD, WA, 98367
Contractor's Registration No. NICHOD1137OM Date 06/06/2016

*ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.*

# APPENDIX C

Soil Map—Pierce County Area, Washington
(Sullivan_3175-001A_Parcel)


Map Scale: 1:1,120 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 11, Sep 9, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 1, 2011—Aug 20, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Pierce County Area, Washington (WA653) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| 16C | Harstine gravelly ashy sandy loam, 6 to 15 percent slopes | 4.5 | 88.4% |
| 16D | Harstine gravelly ashy sandy loam, 15 to 30 percent slopes | 0.6 | 11.6% |
| **Totals for Area of Interest** | | **5.1** | **100.0%** |

# Pierce County Area, Washington

## 16C—Harstine gravelly ashy sandy loam, 6 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 2rtvj
*Elevation:* 200 to 390 feet
*Mean annual precipitation:* 30 to 55 inches
*Mean annual air temperature:* 48 to 52 degrees F
*Frost-free period:* 180 to 200 days
*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Harstine and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Harstine

#### Setting

*Landform:* Ridges
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Nose slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Sandy glacial drift with an influence of volcanic ash over dense glaciomarine deposits

#### Typical profile

*Oi - 0 to 0 inches:* slightly decomposed plant material
*Oe - 0 to 1 inches:* moderately decomposed plant material
*Bw1 - 1 to 6 inches:* gravelly ashy sandy loam
*Bw2 - 6 to 14 inches:* gravelly ashy sandy loam
*Bw3 - 14 to 22 inches:* gravelly ashy sandy loam
*Bw4 - 22 to 32 inches:* gravelly ashy sandy loam
*2Cd1 - 32 to 38 inches:* gravelly loamy sand
*2Cd2 - 38 to 61 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 6 to 15 percent
*Depth to restrictive feature:* 20 to 39 inches to densic material
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)
*Depth to water table:* About 24 to 37 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 4.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* C
*Other vegetative classification:* Limited Depth Soils (G002XN302WA)
*Hydric soil rating:* No

**Minor Components**

**Indianola**

*Percent of map unit:* 5 percent
*Landform:* Eskers, kames, terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Norma**

*Percent of map unit:* 3 percent
*Landform:* Depressions, drainageways
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave, linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Dupont**

*Percent of map unit:* 3 percent
*Landform:* Depressions, troughs
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave, linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Neilton**

*Percent of map unit:* 2 percent
*Landform:* Outwash terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Mckenna**

*Percent of map unit:* 2 percent
*Landform:* Depressions, drainageways
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave, linear
*Across-slope shape:* Concave

*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 11, Sep 9, 2016

# Pierce County Area, Washington

## 16D—Harstine gravelly ashy sandy loam, 15 to 30 percent slopes

### Map Unit Setting

*National map unit symbol:* 2rtvk
*Elevation:* 200 to 390 feet
*Mean annual precipitation:* 30 to 55 inches
*Mean annual air temperature:* 48 to 52 degrees F
*Frost-free period:* 180 to 200 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Harstine and similar soils:* 90 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Harstine

#### Setting

*Landform:* Ridges
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Sandy glacial drift with an influence of volcanic ash over dense glaciomarine deposits

#### Typical profile

*Oi - 0 to 0 inches:* slightly decomposed plant material
*Oe - 0 to 1 inches:* moderately decomposed plant material
*Bw1 - 1 to 6 inches:* gravelly ashy sandy loam
*Bw2 - 6 to 14 inches:* gravelly ashy sandy loam
*Bw3 - 14 to 22 inches:* gravelly ashy sandy loam
*Bw4 - 22 to 32 inches:* gravelly ashy sandy loam
*2Cd1 - 32 to 38 inches:* gravelly loamy sand
*2Cd2 - 38 to 61 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 15 to 30 percent
*Depth to restrictive feature:* 20 to 39 inches to densic material
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)
*Depth to water table:* About 24 to 37 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 4.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C
*Other vegetative classification:* Limited Depth Soils (G002XN302WA)
*Hydric soil rating:* No

**Minor Components**

**Indianola**

*Percent of map unit:* 5 percent
*Landform:* Eskers, kames, terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Neilton**

*Percent of map unit:* 5 percent
*Landform:* Outwash terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

# Data Source Information

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 11, Sep 9, 2016

# APPENDIX C

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Airport

Application No.

Permit No.

(1) OWNER: Name A. L. Hart (Tallman) Address 15616 Crescent Valley Dr. N.W. Gig Harbor, Wn.

(2) LOCATION OF WELL: County Pierce — NE ¼ NE ¼ Sec. 17 T. 22 N., R. 2E W.M.

Bearing and distance from section or subdivision corner A

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well [X] Method: Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 90 ft. Depth of completed well 90 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 85½ ft.
Threaded [ ] " Diam. from ft. to ft.
Welded [X] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes [X] No [ ]
Manufacturer's Name Johnson
Type stainless steel Model No.
Diam. 6 Slot size 35 from 85 ft. to 90 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes [ ] No [X] To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ~340 ft.
Static level 45 ft. below top of well Date 10-16-62
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test 10-16-62
Bailer test 40 gal./min. with 25 ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

| MATERIAL | FROM | TO |
|---|---|---|
| Topsoil | 0 | 2 |
| Sand & gravel brown hardpan | 2 | 37 |
| Blue sand & gravel hardpan | 37 | 53 |
| Sand & gravel some water | 53 | 63 |
| Gray hardpan some seepage | 63 | 84 |
| Sand & gravel water bearing | 84 | 90 |

RECEIVED
JUN 12 1975
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

22/23-17A/1

Work started 10-13- 19 62 Completed 10-16- 19 62

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Harbor Pump & Drilling Co., Inc.
(Person, firm, or corporation) (Type or print)

Address 7825 46th Ave. N.W. Gig Harbor, Wn 9833

[Signed] Byrd Gustin By: M. Butler
(Well Driller)

License No. 0476 223 01 8455 Date 6-11- 19 74

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT
## STATE OF WASHINGTON

Application No
Permit No

(1) **OWNER:** Name Harvey Brown Address 15712 Crescent Valley Dr. NW Gig Hrb

(2) **LOCATION OF WELL:** County Pierce NE ¼ NE ¼ Sec. 17 T. 22 N., R. 2E W.M.

Bearing and distance from section or subdivision corner

(3) **PROPOSED USE:** Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 6 inches.
Drilled 86' ft. Depth of completed well 86' ft.

(6) **CONSTRUCTION DETAILS:**
**Casing installed:** 6 " Diam. from 0 ft. to 82 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

**Perforations:** Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

**Screens:** Yes ☒ No ☐ Johnson
Manufacturer's Name
Type stainless steel Model No. 86
Diam. 6 Slot size 60 from 82 ft. to 86 ft.
Diam. Slot size from ft. to ft.

**Gravel packed:** Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

**Surface seal:** Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite 100 lbs.
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) **PUMP:** Manufacturer's Name Berkeley
Type: Submersible H.P.

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ft.
Static level 46 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test
Bailer test 10 gal./min. with 20 ft. drawdown after 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG:**
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

| MATERIAL | FROM | TO |
|---|---|---|
| Brown top soil | 0 | 3 |
| Gray Hard pan | 3 | 26 |
| Sandy brown hard pan | 26 | 31 |
| Brown sand, some seepage | 31 | 38 |
| Brown sandy clay | 38 | 43 |
| Gray sandy hard pan | 43 | 60 |
| Gray Hard pan | 60 | 68 |
| Gray hard pan with clay | 68 | 74 |
| Gray sand and gravel, - water bearing | 74 | 77 |
| Hard packed sand & gravel | 77 | 82 |
| Gray sand & gravel, water | 82 | 86 |
| Card packed sand & gravel | 86 | - |

RECEIVED
MAY 22 1980
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 4-24, 19 80 Completed 4-28, 19 80

**WELL DRILLER'S STATEMENT:**

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME HARBOR PUMP & DRILLING CO., INC.
(Person, firm, or corporation) (Type or print)

Address 11302 Burnham Dr. NW Gig Harbor, W

[Signed] Wadsworth By: F. Miller
(Well Driller)

License No. 223-01-8455 Date April 29, 19 80

597

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name John Berry [redacted]

(2) LOCATION OF WELL: County Pierce SW ¼ NE ¼ Sec 17 T 22 N., R 2E W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) [redacted] 98335

(3) PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☒ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well Six inches. Drilled 151 feet. Depth of completed well 151 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +1 ft. to 146 ft.
Welded ☒ _____ " Diam. from _____ ft. to _____ ft.
Liner installed ☐
Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Cook
Type Stainless Model No. _____
Diam. 6 Slot size 12 from 146 ft. to 151 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name Gould
Type: Submersible H.P. 3/4

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 90 ft. below top of well Date 2-21-91
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? P x P
Yield: 14 gal./min. with 7 ft. drawdown after 2 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 6 | 17 | | | | |
| 2 | 90 | | | | |

Date of test _____
Bailer test 20 gal./min. with 10 ft. drawdown after 1 hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Top Soil | 0 | 2 |
| Sand Brown | 2 | 13 |
| Hard pan | 13 | 33 |
| Sand + Gravel (Water) | 33 | 35 |
| Clay (Blue) | 35 | 122 |
| Hard pan | 122 | 125 |
| Sand + Gravel (Water) | 125 | 151 |

Work started Aug - 30 19 90 Completed Sept 6 19 90

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME P x P Well Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Port Orchard

(Signed) P.T Woolley (WELL DRILLER) License No. 0521

Contractor's Registration No. PP W.H INC Date Sept 10, 19 90

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10 87) -1329-

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. 065839
Water Right Permit No.

(1) OWNER: Name STACY BRIAN Address 1211 SUNSET DR S TACOMA, WA 98465-

(2) LOCATION OF WELL: County PIERCE - NE 1/4 NW 1/4 Sec 17 T 22 N., R 2E WM
(2a) STREET ADDRESS OF WELL (or nearest address) 3103 [illegible] ST NW

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: AIR ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 53 ft. Depth of completed well 47 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from 0 ft. to 47 ft.
WELDED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: NO
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: NO
Manufacturer's Name
Type Model No.
Dian. slot size from ft. to ft.
Dian. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 18 ft.
Material used in seal BENTONITE CLAY
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 20 ft. below top of well Date 12/03/90
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |

Date of test / /
Bailer test 30 gal/min. 25 ft. drawdown after 1 hrs.
Air test gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratus penetrated, with at least one entry for each change in formation.

| MATERIAL | FROM | TO |
|---|---|---|
| SANDY TOPSOIL | 0 | 2 |
| SAND AND SOME GRAVEL | 2 | 9 |
| COMPACTED SAND | 9 | 14 |
| COMPACTED SAND AND CLAY | 14 | 24 |
| SEEPAGE SAND CLAY | 24 | 26 |
| HARDPAN | 26 | 42 |
| WATER BAND & GRAVEL | 42 | 47 |
| DIRTY SAND | 47 | 53 |

Work started 11/30/90 Completed 12/03/90

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME RICHARDSON WELL DRILLING (Person, firm, or corporation) (Type or print)

ADDRESS PO BOX 44427 TAC WA 98444

[SIGNED] [signature] License No. 0284

Contractor's Registration No. RICHAW*321OB Date 01/22/91

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W052689

UNIQUE WELL I.D. # ABP815

Water Right Permit No. _____

(1) OWNER: Name PEDRO AND WENDY PINTO Address 22404 Military Road S., Sea-Tac, WA 98198

(2) LOCATION OF WELL: County Pierce NW 1/4 NE 1/4 Sec 17 T. 22 N, R 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) off Crescent Valley Road

(3) PROPOSED USE: [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned [ ] New well [X] Method: Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 178 feet. Depth of completed well 178 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 178 ft.
Welded [X]
Liner installed [ ] " Diam. from ft. to ft.
Threaded [ ] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes [ ] No [X]
Manufacturer's Name _____
Type _____ Model No. _____
Diam. ____ Slot size _____ from _____ ft. to _____ ft.
Diam. ____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes [ ] No [XX] Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name Goulds
Type: submersible 10GS10 H.P. 1

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 107 ft. below top of well Date 5/02/95
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [X] No [ ] If yes, by whom? Gresham
Yield: 15 gal./min. with 18 ft. drawdown after 2 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| Full recov. in 5 min. | | | | | |

Date of test 5/02/95
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest 20+ gal./min. with stem set at 170 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 50 Was a chemical analysis made? Yes [X] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Brown topsoil | 0 | 4 |
| Gray hardpan | 4 | 27 |
| Gray silty sand & gravel | 27 | 69 |
| Gray hardpan | 69 | 93 |
| Gray silty sand & gravel | 93 | 131 |
| Gray hardpan | 131 | 164 |
| Gray clay w/gravel | 164 | 167 |
| Gray silty coarse sand & gravel, H20 | 167 | 178 |

Work Started 4/26/95 19. Completed 4/27/95 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Gresham Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 3105 NW Lakeness Rd.,Poulsbo, WA 98370

(Signed) _____ (WELL DRILLER) License No. 0761

Contractor's Registration No. GRESHWD055BC Date 5/04/95 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W053930

UNIQUE WELL I.D. # ABP828

Water Right Permit No. _____

(1) OWNER: Name MARK KNOWLES Address 21600 24TH AVE.S.#E101, DES MOINES,WA 98198

(2) LOCATION OF WELL: County PIERCE . NW 1/4 NE 1/4 Sec 17 T. 22 N. R 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 15821 28TH AVENUE NW, GIG HARBOR

(3) PROPOSED USE: [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned [ ] New well [X] Method: Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [XX] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 119 feet. Depth of completed well 119 ft.

(6) CONSTRUCTION DETAILS:

Casing Installed: 6 " Diam. from 0 ft. to 119 ft.
Welded [X]
Liner installed [ ] " Diam. from ft. to ft.
Threaded [ ] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes [ ] No [XX]
Manufacturer's Name _____
Type _____ Model No. _____
Diam. ____ Slot size _____ from _____ ft. to _____ ft.
Diam. ____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name GOULDS
Type: SUBMERSIBLE 10GS10 H.P. 1

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 72 ft. below top of well Date 6/09/95
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [XX] No [ ] If yes, by whom? GRESHAM
Yield: 15 gal./min. with 5 ft. drawdown after 1 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| FULL RECOV. | | IN 2 MIN. | | | |
| | | | | | |
| | | | | | |

Date of test 6/09/95
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest 20 gal./min. with stem set at 115 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 50 Was a chemical analysis made? Yes [XX] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| OVERBURDEN | 0 | 4 |
| GRAY HARDPAN | 4 | 28 |
| GRAY SAND & GRAVEL | 28 | 52 |
| BLUE CLAY | 52 | 78 |
| GRAVEL, H2O - 2GPM | 78 | 79 |
| GRAY HARDPAN | 79 | 112 |
| GRAVEL, H2O | 112 | 119 |

Work Started 6/07/95 19. Completed 6/07/95 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME GRESHAM WELL DRILLING, INC. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 3105 NW LAKENESS RD.,POULSBO,WA 98370

(Signed) _____ (WELL DRILLER) License No. 0761

Contractor's Registration No. GRESHWD055BC Date 6/16/95 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT

STATE OF WASHINGTON ECOLOGY — Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

**Construction/Decommission** *("x" in circle)*

(●) Construction

( ) Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* 127549

**PROPOSED USE:** [■] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other

**TYPE OF WORK:** Owner's number of well (if more than one)

[■] New Well [ ] Reconditioned *Method* [ ] Dug [ ] Bored [ ] Driven [ ] Deepened [■] Cable [ ] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 102 ft. Depth of completed well 103 ft.

**CONSTRUCTION DETAILS**

Casing Installed: [■] Welded 6" Diam from 0 ft. to 103 ft.

[ ] Liner installed ___" Diam from ___ ft. to ___ ft.

[ ] Threaded ___" Diam. from ___ ft. to ___ ft.

**Perforations:** [ ] Yes [■] No

Type of perforator used

SIZE of perfs ___ in by ___ in and no of perfs ___ from ___ ft to ___ ft

**Screens:** [■] Yes [ ] No [■] K-Pac Location 96

Manufacturer's Name Johnson

Type Stainless Steel Model No

Diam 5" Slot Size 10 from 102 ft to 96 ft

Diam ___ Slot Size ___ from ___ ft to ___ ft

**Gravel/Filter packed:** [ ] Yes [■] No [ ] Size of gravel/sand

Materials placed from ___ ft to ___ ft.

**Surface Seal:** [■] Yes [ ] No To what depth? 19 ft

Materials used in seal Bentonnite

Did any strata contain unusable water? [ ] Yes [■] No

Type of water? Depth of strata

Method of sealing strata off

**PUMP:** Manufacturer's Name

Type H P

**WATER LEVELS:** Land-surface elevation above mean sea level ___ ft.

Static level 65 ft below top of well Date

Artesian pressure ___ lbs per square inch Date

Artesian water is controlled by (cap,valve, etc)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? [■] Yes [ ] No If yes, by whom?

Yield 10 gal./min with 25' ft drawdown after 2 hrs

Yield ___ gal./min with ___ ft drawdown after ___ hrs

Yield ___ gal./min with ___ ft drawdown after ___ hrs

*Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| Pump Off | 74' | | | | |
| 1 Min | 67' | | | | |
| | | | | | |

Date of test

Bailer test 12 gal./min with ___ ft drawdown after 2 hrs

Airtest ___ gal./min with stem set at ___ ft for ___ hrs

Artesian flow ___ g p m Date

Temperature of water ___ Was a chemical analysis made? [ ] Yes [ ] No

CURRENT Notice of Intent No. W061595

Unique Ecology Well ID Tag No. AIA-064

Water Right Permit No.

Property Owner Name JOE LAW

Well Street Address 18826 28th AVE N.W.

City GIG HARBOR County: PIERCE

Location NE 1/4 - 1/4 NW 1/4 Sec 17 Twn 22 R 2 (EWM) circle one

Lat/Long: (s,t,r still REQUIRED) Lat Deg ___ Lat Min/Sec ___ Long Deg ___ Long Min/Sec ___ WWM

Tax Parcel No. 0222171054

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Top soil | 0 | 4 |
| clay-gravel | 4 | 11 |
| clay-gravel-boulder | 11 | 16 |
| brown sand | 16 | 47 |
| gravel-sand-clay | 47 | 83 |
| gray clay-sand | 83 | 85 |
| gravel-sand-clay | 85 | 96 |
| sand gray WBr. | 96 | 102 |

RECEIVED
JAN 16 2003
Washington State Department of Ecology

Start Date 12/4/02 Completed Date 12/23/02

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[■] Driller [ ] Engineer [ ] Trainee Name (Print) Bruce Lewis

Driller/Engineer/Trainee Signature Bruce Lewis

Driller or Trainee License No. 2627

Drilling Company Harbor Pump Co. Inc.

Address P.O. Box 330

City, State, Zip Burley WA. 98322

Contractor's Registration No. HARBOPC114DA Date 1/13/03

If trainee, licensed driller's Signature and License no.

Ecology is an Equal Opportunity Employer ECY 050-1-20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the information on this well Report.

# WATER WELL REPORT

ECOLOGY Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

**Construction/Decommission** *("x" in circle)*

(X) Construction

( ) Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* 130700

CURRENT Notice of Intent No. W162612

Unique Ecology Well ID Tag No. AGE 533

Water Right Permit No. _____

Property Owner Name ANN Lemieux

Well Street Address 15625 Crescent Vy Dr NW

City Gig Harbor County: Pierce

Location NE 1/4- 1/4 NE 1/4 Sec 17 Twn 22 R 2 (EWM) or WWM *circle one*

Lat/Long: (s,t,r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0228171065

**PROPOSED USE:** [X] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

[X] New Well [ ] Reconditioned [ ] Deepened *Method:* [ ] Dug [ ] Bored [ ] Driven [X] Cable [ ] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 218 ft. Depth of completed well 218 ft.

**CONSTRUCTION DETAILS**

Casing Installed: [X] Welded 6" Diam from +1 ft to 213 ft

[ ] Liner installed _____" Diam from _____ ft to _____ ft

[ ] Threaded _____" Diam from _____ ft to _____ ft.

**Perforations:** [ ] Yes [X] No

Type of perforator used _____

SIZE of perfs _____ in by _____ in. and no of perfs _____ from _____ ft to _____ ft

**Screens:** [X] Yes [ ] No [ ] K-Pac Location _____

Manufacturer's Name _____

Type S/S Model No _____

Diam 6" Slot Size .010 from 213 ft to 218 ft

Diam _____ Slot Size _____ from _____ ft to _____ ft

**Gravel/Filter packed:** [ ] Yes [X] No [ ] Size of gravel/sand _____

Materials placed from _____ ft to _____ ft.

**Surface Seal:** [X] Yes [ ] No To what depth? 18 ft

Materials used in seal Holeplug

Did any strata contain unusable water? [ ] Yes [X] No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name Gould

Type Submersible HP 3/4

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft

Static level 92.5 ft below top of well Date 3/5/03

Artesian pressure _____ lbs per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? [X] Yes [ ] No If yes, by whom? by Driller

Yield 16 gal./min with 45 ft. drawdown after 1 hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

Yield _____ gal./min with _____ ft drawdown after _____ hrs

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 0 | 137 | 2010 | 92.5 | | |
| 5'00 | 110 | | | | |
| 10'00 | 96 | | | | |

Date of test _____

Bailer test _____ gal./min with _____ ft. drawdown after _____ hrs

Airtest _____ gal./min with stem set at _____ ft for _____ hrs

Artesian flow _____ g p m Date _____

Temperature of water _____ Was a chemical analysis made? [ ] Yes [ ] No

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

| MATERIAL | FROM | TO |
|---|---|---|
| Top soil | 0 | 1 |
| Sand & gravel | 1 | 5 |
| gravely Hardpan | 5 | 60 |
| Hardpan | 60 | 88 |
| Sand | 88 | 91 |
| Clayish Hardpan & gravel | 91 | 194 |
| Fine Sand | 194 | 210 |
| Sand | 210 | 218 |

RECEIVED
APR 04 2003
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT
DEPT. OF ECOLOGY FISCAL/G BUDGET
03 APR 1 P1:04

Start Date 2/17/03 Completed Date 3/4/03

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) Wesley Glessner

Driller/Engineer/Trainee Signature Wesley Glessner

Driller or Trainee License No. 0154

Drilling Company Wes Glessner Drilling

Address PO Box 487

City, State, Zip Burley Wa. 98322

Contractor's Registration No WESGLD*026P6 Date 3/5/03

If trainee, licensed driller's Signature and License no. _____

Ecology is an Equal Opportunity Employer ECY 050-1-20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Department of Ecology does NOT warranty the data and/or the information on this Well Report.

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

**Construction/Decommission** *("x" in circle)* 282131

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* _____

**PROPOSED USE:** ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 148 ft. Depth of completed well 148 ft.

**CONSTRUCTION DETAILS**

Casing Installed: ☒ Welded 6" Diam. from 0 ft. to 233 ft.

☐ Liner installed ____" Diam. from ____ ft. to ____ ft.

☐ Threaded ____" Diam From ____ ft. to ____ ft.

**Perforations:** ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

**Screens:** ☒ Yes ☐ No ☒ K-Pac Location 141' 10-3/4"

Manufacturer's Name JNSN

Type SS Model No. TELES

Diam. 5" Slot size 18 from 143 ft. to 148 ft.

Diam ____ Slot size ____ from ____ ft. to ____ ft.

**Gravel/Filter packed:** ☐ Yes ☒ No Size of gravel/sand ____

Materials placed from ____ ft. to ____ ft.

**Surface Seal:** ☒ Yes ☐ No To what depth? 18 ft

Material used in seal BENTONITE

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name _____

Type: _____ H.P. _____

**WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.

Static level 83 ft below top of well Date 11/13/2007

Artesian pressure ____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? _____

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test _____

Bailer test 15 gal./min. with 24 ft drawdown after 1 hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date _____

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☐ No

## CURRENT

**Notice of Intent No.** WEO7604

Unique Ecology Well ID Tag No. BAT439

Water Right Permit No. _____

Property Owner Name WILLIAM SARNO

Well Street Address 15905 28TH AVE NW

City GIG HARBOR County PIERCE

Location NW1/4-1/4 NE1/4 Sec 17 Twn 22 R 2E EWM ☒ Or WWM ☐

**(s, t, r Still REQUIRED)**

**Lat/Long** Lat Deg ____ Lat Min/Sec ____

Long Deg ____ Long Min/Sec ____

Tax Parcel No. (Required) 0222175005

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| PIPE STICK UP | 0 | 1 |
| BROWN SAND, CLAY, GRAVEL | 1 | 16 |
| GRAY SAND, GRAVEL, WET | 16 | 21 |
| BROWN SAND, GOME GRAVEL, WET | 21 | 41 |
| GRAY SAND, CLAY, GRAVEL, | 41 | |
| SEAMS WET | | 61 |
| GRAY SILT, SAND, GRAVEL | 61 | 85 |
| GRAY SAND, GRAVEL, SEAMS WATR | 85 | 109 |
| GRAY SILT, SAND, GRAVEL, CLAY | 109 | 140 |
| GRAY SAND, GRAVEL, SEAMS WATR | 140 | 148 |

RECEIVED

DEC 10 2007

Washington State Department of Ecology

Start Date 11/7/2007 Completed Date 11/13/2007

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JOHN SULLIVAN

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 2218

IF TRAINEE: Driller's License No:

Driller's Signature:

Drilling Company NICHOLSON DRILLING INC

Address PO BOX 123

City, State, Zip PORT ORCHARD , WA, 98366

Contractor's Registration No. NICHOD11370M Date 11/30/2007

22-2E-20F

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

**Construction/Decommission** *("x" in circle)*

⊗ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 205208

**CURRENT**
**Notice of Intent No.** W216866

Unique Ecology Well ID Tag No. APR640

Water Right Permit No. _____

Property Owner Name Swen Weinmann

Well Street Address 15515 30th AVE NW

City Gig Harbor County Pierce

Location SE 1/4-1/4 NW 1/4 Sec 20 Twn 22N R 2E EWM or WWM (circle one)

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 0222171051

**PROPOSED USE:** ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

**TYPE OF WORK:** Owner's number of well (if more than one) _____

☒ New well ☐ Reconditioned ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☒ Cable ☐ Rotary ☐ Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 160 ft. Depth of completed well 160 ft.

**CONSTRUCTION DETAILS**

Casing Installed: ☒ Welded 6" Diam. from +1 ft. to 155 ft. ☐ Liner installed _____" Diam. from _____ ft. to _____ ft. ☐ Threaded _____" Diam. from _____ ft. to _____ ft.

**Perforations:** ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs ___ in. by ___ in. and no. of perfs ___ from ___ ft. to ___ ft.

**Screens:** ☒ Yes ☐ No ☒ K-Pac Location 154

Manufacturer's Name Johnson

Type Stainless steel Model No. _____

Diam. 5 Slot size 14 from 155 ft. to 160 ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

**Gravel/Filter packed:** ☐ Yes ☒ No ☐ Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

**Surface Seal:** ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

**PUMP:** Manufacturer's Name Goulds

Type: Submersible H.P. 1

**WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.

Static level 108 ft. below top of well Date 10/25/07

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Olsen Drl.

Yield: 15 gal./min. with 9 ft. drawdown after 1 hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 0 | 117' | 3 m | 108' | | |
| 1 m | 111' | | | | |
| 2 m | 104' | | | | |

Date of test 10/25/07

Bailer test 10 gal./min. with 8 ft. drawdown after 2 hrs.

Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☒ Yes ☐ No

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Brown sand | 0 | 37 |
| Grey till | 37 | 132 |
| Grey clay | 132 | 136 |
| Grey sand | 136 | 145 |
| Grey sand w/b | 145 | 160 |
| Grey tight sand | 160 | ---- |

RECEIVED
NOV 14 2007
DEPT. OF ECOLOGY

Start Date 9/20/07 Completed Date 10/25/07

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Matt Olsen

Driller/Engineer/Trainee Signature Matt Olsen

Driller or trainee License No. 2337

Drilling Company Olsen Drilling

Address PO Box 1554

City, State, Zip Port Orchard, WA 98366

Contractor's Registration No. OLSEND101LJ Date 11/9/07

**If TRAINEE,**
**Driller's Licensed No.** _____
**Driller's Signature** _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

339850

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. W 34136
UNIQUE WELL I.D. # ABG 626
Water Right Permit No.

(1) OWNER: Name Hall Stroni, Ulvik Address 4811 No. Highland, Tacoma WA

(2) LOCATION OF WELL: County Pierce NW 1/4 NW 1/4 Sec 17 T. 22N N. R 2E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 3025 156th St. N.W., Gig Harbor, WA

(3) PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☑ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches. Drilled 53 feet. Depth of completed well 53 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from +2 ft. to 53 ft.
Welded ☒
Liner installed ☐
Threaded ☐
Diam. from ft. to ft.
Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 19.5 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 22 ft. below top of well Date Nov 3, 1994
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 9-10 gal./min. with stem set at 53' ft. for 2.0 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Top Soil | 0 | 2 |
| Brn Sands some Traces of Brn Silts | 2 | 11 |
| Brn Silts & Medium Sands & Small Amounts of Gravels | 11 | 31 |
| Silty, Gray Sands & Clays | 31 | 96 |
| Gravels & Sands w/ Water Bearing | 96 | 53 |

RECEIVED
94 DEC 12 A9:47
STATE OF WASHINGTON
DEPT. OF ECOLOGY

Work Started Nov 2 19 Completed Nov 3 19 94

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Hall Testing Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10621 Todd Rd., Puyallup
(Signed) [signature] (WELL DRILLER) License No. 2148
Contractor's Registration No. HALLTI087OJ Date Nov 3 19 94

(USE ADDITIONAL SHEETS IF NECESSARY)

ECL 050 1-20 (2/93)

# WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

**Construction/Decommission** *("x" in circle)*

- [x] Construction
- [ ] Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* WE21844

**PROPOSED USE:** [x] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other

**TYPE OF WORK:** Owner's number of well (if more than one) ____

[x] New well [ ] Reconditioned *Method:* [ ] Dug [ ] Bored [ ] Driven [ ] Deepened [ ] Cable [x] Rotary [ ] Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 98 ft. Depth of completed well 98 ft.

***CONSTRUCTION DETAILS***

Casing [x] Welded 6" Diam. from 0 ft. to 96 ft.

Installed: [ ] Liner installed ____" Diam. from ____ ft. to ____ ft.

[ ] Threaded ____" Diam. From ____ ft. to ____ ft.

**Perforations:** [ ] Yes [x] No

Type of perforator used ____

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

**Screens:** [x] Yes [ ] No [ ] K-Pac Location ____

Manufacturer's Name JOHNSON

Type STAINLESS STEEL Model No. TELESCOPE

Diam. 6 Slot size 16 from 93 ft. to 98 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

**Gravel/Filter packed:** [ ] Yes [x] No Size of gravel/sand ____

Materials placed from ____ ft. to ____ ft.

**Surface Seal:** [x] Yes [ ] No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? [ ] Yes [x] No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

**PUMP:** Manufacturer's Name ____

Type: ____ H.P. ____

**WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.

Static level 40 ft. below top of well Date ____

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? [ ] Yes [x] No If yes, by whom? ____

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test ____

Bailer test 10 gal./min. with 9 ft. drawdown after 1 hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? [ ] Yes [x] No

**CURRENT**

Notice of Intent No. WE21844

Unique Ecology Well ID Tag No. BHY 098

Water Right Permit No. ____

Property Owner Name David and Liz Stanton

Well Street Address 2811 159th ST CT NW

City Gig Harbor County Pierce

Location ne 1/4-1/4 ne 1/4 Sec 17 Twn 22 R 2E EWM [x] Or WWM [ ]

(s, t, r Still REQUIRED)

Lat/Long

Lat Deg ____ Lat Min/Sec ____

Long Deg ____ Long Min/Sec ____

Tax parcel No. (Required) 022175008

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Pipe stick up | 0 | 1 |
| Brown grey fill | 1 | 3 |
| Grey sand gravel clay wet | 3 | 16 |
| Grey sand gravel water | 16 | 34 |
| Grey sand gravel clay wet | 34 | 77 |
| Grey sand gravel water | 77 | 98 |

RECEIVED

MAY 27 2016

WA State Department of Ecology (SWRO)

Start Date 01/10/2016 Completed Date 01/20/2016

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[x] Driller [ ] Engineer [ ] Trainee Name Nic Sample

Driller/Engineer/Trainee Signature ____

Driller or trainee License No. 2770

IF TRAINEE: Driller's License No:

Driller's Signature: ____

Drilling Company Nicholson Drilling INC.

Address PO BOX 123

City, State, Zip Port Orchard, WA, 98367

Contractor's Registration No. NICHODI137OM Date 02/15/2016

*ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.*

The Department of Ecology does NOT Warranty the Data and/or the information on this Well Report

# WATER WELL REPORT

Original & 1st copy – Ecology; 2nd copy – owner; 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

**Construction/Decommission** *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

*Notice of Intent Number* WE21843

**PROPOSED USE:** ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ____

**TYPE OF WORK:** Owner's number of well (if more than one) ____

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

**DIMENSIONS:** Diameter of well 6 inches, drilled 151 ft.

Depth of completed well 151 ft.

**CONSTRUCTION DETAILS**

Casing ☒ Welded 6 " Diam. from 0 ft. to 151 ft.

Installed: ☐ Liner installed ____ " Diam. from ____ ft. to ____ ft.

☐ Threaded ____ " Diam. From ____ ft. to ____ ft.

**Perforations:** ☐ Yes ☒ No

Type of perforator used ____

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

**Screens:** ☐ Yes ☒ No ☐ K-Pac Location ____

Manufacturer's Name ____

Type ____ Model No. ____

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

**Gravel/Filter packed:** ☐ Yes ☒ No Size of gravel/sand ____

Materials placed from ____ ft. to ____ ft.

**Surface Seal:** ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal BENTONITE

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

**PUMP:** Manufacturer's Name ____

Type: ____ H.P. ____

**WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.

Static level 74 ft. below top of well Date ____

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

**WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom? ____

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

*Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)*

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Date of test ____

Bailer test 17 gal./min. with 27 ft. drawdown after 1 hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☒ No

**CURRENT**

Notice of Intent No. WE21843

Unique Ecology Well ID Tag No. BJN 278

Water Right Permit No. ____

Property Owner Name DAVID STANTON

Well Street Address 2917 159TH ST CT NW

City GIG HARBOR County PIERCE

Location nwl/4-1/4 ne 1/4 Sec 17 Twn 22 R 2E EWM ☒ Or WWM ☐

(s, t, r Still REQUIRED)

Lat/Long

Lat Deg ____ Lat Min/Sec ____

Long Deg ____ Long Min/Sec ____

Tax parcel No. (Required) 0222175007

**CONSTRUCTION OR DECOMMISSION PROCEDURE**

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

| MATERIAL | FROM | TO |
|---|---|---|
| Pipe stick up | 0 | 1 |
| Grey sand gravel clay wet | 1 | 13 |
| Grey clay | 13 | 24 |
| Brown sand silt wet | 24 | 33 |
| Brey sand gravel cley damp | 33 | 109 |
| Grey clay | 109 | 136 |
| Grey sand gravel clay | 136 | 145 |
| Grey coarse sand gravel water | 145 | 151 |

RECEIVED

JUN 09 2016

WA State Department of Ecology (SWRO)

Start Date 02/02/16 Completed Date 02/04/16

**WELL CONSTRUCTION CERTIFICATION:** I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name NIC SAMPLE

Driller/Engineer/Trainee Signature ____

Driller or trainee License No. 2770

IF TRAINEE: Driller's License No:

Driller's Signature: ____

Drilling Company NICHOLSON DRILLING INC.

Address PO BOX 123

City, State, Zip PORT ORCHARD, WA, 98367

Contractor's Registration No. NICHOD1137OM Date 06/06/2016

*ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.*

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report